National Standards, Scope and Sequence: A Strategic Review of Approaches in Australia, Chile and USA

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Contents

1. Introduction

Before focusing on the detail to be included in its national curriculum, each country has to make important decisions about the foundations on which the curriculum will be built. Two of these foundations are usually the national standards and the scope and sequence.

The national standards set out the expectations for the achievement of learners as a result of their study of the new curriculum.

The scope and sequence provides an overview of the learning. Without providing the level of detail of a syllabus, the scope and sequence expresses the expected range and depth of subject coverage and shows how it develops in a logical sequence over time.

Both national standards and scope and sequence documents are normally presented subject by subject, although standards might also refer to generic, cross-curricular learning of competences or themes.

The three countries that are the focus of this analysis- Australia, Chile, USA- show contrasting approaches to national standards and scope and sequence. Both Australia and USA have developed their curricula in the face of similar challenges to those of Brazil. All three of these countries are composed of states that have been accustomed to operating autonomously, each with its own established curriculum. At the time of writing, Chile is the highest achieving country in South America in terms of its performance in international PISA tests, although its position does not compare well with leading jurisdictions around the world.

The subjects covered in this analysis are national language (English in Australia and USA; Spanish in Chile), mathematics and science. The national curriculum of both Australia and Chile covers all three of these subject areas and more. The USA's Common Core focuses only on English and mathematics, leaving the science standards as the responsibility of the separate states. Hence the science analysis below includes only Australia and Chile.

2. Rationale for Standards and Scope and Sequence

Wherever it takes place, the key driver for curriculum review is standards. All countries want the best outcomes for their learners and the quality of the curriculum is critical to achieving them. However, not every country has chosen to develop national standards.

Having committed to curriculum review, the logical next steps are to set out the standards expected as a result of the new curriculum and to outline the expected learning through which they should be achieved. This is commonly done with a set of national standards and a scope and sequence document.
Of the three countries covered in this analysis:

- Australia has both national standards and scope and sequence documents,
- Chile has scope and sequence documents but no national standards and

- USA has its Common Core which is a set of standards but there is no national scope and sequence documentation. Hence USA does not have a curriculum and it is up to the separate states to develop their own.

Other approaches include:

- National learning objectives – a set of objectives encompassing both the coverage and the standard of expected learning

- A learner profile – a description of the desired attributes a learner should develop as a result of studying the curriculum

- Level descriptors – a set of descriptions of what an observer should expect a learner to know, understand or be able to do as they progress through their schooling. These are not necessarily aligned with grades.

- Examples of expected performance – descriptions of the kind of performance learners might display that show they have achieved a particular level

- Exemplification of learner expectation – documentation showing practical examples of learners' work to demonstrate what a successful outcome looks like for those meeting the expected standard (and sometimes also for those exceeding or failing to meet expectation)

These options can be used in addition to or in place of standards and scope and sequence documents.

It should be noted that there is often a fine line between standards and scope and sequence and a single word can distinguish one from the other. For example, '*The range of small and large cosmic structures from asteroids to galaxies and clusters of galaxies'* is a description of learning that might be found in a scope and sequence document. However '*Explain the range of small and large cosmic structures from asteroids to galaxies and clusters of galaxies'* shows the expectation of what learners should be able to do as a result of their learning and therefore constitutes a standard. In developing standards and scope and sequence documentation, it is important to be constantly aware of selecting and using the right wording and avoiding confusion.

3. The Curriculum in the Three Countries

The Chilean curriculum is an established national curriculum taught in all schools. It is shortly to be reviewed. The implementation of the Australian national curriculum began in 2013, once all states had engaged in developing it collaboratively. Decisions about participation in and implementation of the new USA common core are taken at state level and, at the time of writing, the majority of states (but not all) have committed to it.

The USA common core is not literally a curriculum. It is a set of standards which have been mapped backwards from the 32 College and Career Ready anchor standards, which describe what a student should be able to do at the end of their

schooling. This contrasts with the 'bottom up' approach to curriculum development that many countries take. There are written 'core' standards for every grade, from Kindergarten to grade 12. Each grade represents a year of schooling. There is no national scope and sequence documentation. It is up to states to decide how its schools teach the common core, including what is taught when.

The band level descriptors for Chile included in this research are not approved for use with the current curriculum. The Learning Progress Maps from which the descriptors were drawn have been withdrawn by the government. They are included here as they show an alternative means of expressing standards. They also include annotated portfolios of student work.
Neither the Australian Curriculum nor the USA common core specifies how the content must be taught. The final decision lies with the teacher meaning they can teach the curriculum in accordance with the requirements and needs of their state, school and students. The national curriculum of Chile appears to be more prescriptive.

Table 1. Overview of Standards and Scope and Sequence in the Three Countries

	Australia	Chile	USA
Standards	Year by year standards closely aligned with the curriculum. Standards are expressed in terms of application of learning ie what learners should be able to do rather than simply what they should know.	There is some ambiguity in the documentation relating to the current curriculum. The scope and sequence documents referred to below are described, at least orally in Chile, as 'standards'. The progress maps referred to in this analysis that were used to detail expectation have been withdrawn. The progress maps set out expected levels at the end of each two-year period. The alignment with time periods was approximate, allowing for flexibility to suit learners' needs and potential. Many standards are expressed in terms of application of learning.	Grade by grade standards until the end of Grade 8. Thereafter High School standards are not broken down by grade. Standards are grouped under various headings. Standards are mostly expressed in terms of application of learning. Complex model particularly in relation to English.
Scope and Sequence	Each subject is structured very differently in each country, making comparison difficult. For this reason, in this analysis, the content of the Australian scope and sequence has been used against which to compare the other countries. The structure of each of the analysis documents included here has been designed to suit each particular subject. It is intended		

	that the documents will enable subject teams to easily identify similarities and differences between countries without having to carry out time-consuming research from original documents.		
	Covers from Foundation to Year 10. Details expected learning organised by strands, sub-strands and threads.	Covers from Grade 1 to Grade 8. Details expected learning organised into strands and units of work.	No published scope and sequence document. Common Core standards indicate what might be taught when.

4. Principles for Developing a National Curriculum

The analysis of these curricula highlights a number of questions that need to be addressed by those charged with designing and developing the new national curriculum. Some of these issues are subject specific and will be the focus of the appropriate subject team. However, some have implications for the work of everyone involved in curriculum development and decisions need to be taken a high strategic level.

These high level strategic questions are suggested below:

a. Overall Issues

1. Should Brazil have compulsory national standards?
2. If so, what grades should they cover?
3. Which subjects should be covered and how should they be grouped? For example, should there be grouped subjects such as ‘science’, ‘social studies’ or ‘expressive arts’ or should each science, each humanity and each art subject have its own separate curriculum? Should there be a blend of the two, with grouped subjects for younger grades and separate subjects later on?
4. Within a subject, what is the most appropriate terminology for the levels of organization? Should the levels be called ‘strands’ and ‘sub-strands’ or is there a better alternative? Should this be consistent across all subjects?
5. Should there be a set of national standards and a scope and sequence document for every subject? Which grades should they cover for each subject? Would any additional or alternative documentation be valuable?
6. Should all the subjects covered by the new standards be implemented at the same time or should there be a phased implementation? What should be the time frame for implementation?

b. Standards

7. How prescriptive should the standards be regarding what is studied when? How much flexibility should be built in to allow for variation at state, regional or school level? How much should be left to the discretion of teachers?

8. How much detail should be included in the standards? If standards do not detail all of the expected learning (as is normally the case), what key indicators of learning should be included?
9. Should standards be prescribed year on year or should they set out expectation at the end of every two year period or at the end of each phase of schooling?
10. Should the standards define expectation in terms not just of knowledge but also of competences, skills and attitudes? If so, how will the competences, skills and attitudes be defined? Should standards for each of these categories be set out separately or should every standard capture the expectations relating to knowledge, competences, skills and attitudes and so convey the expectation that learning will be integrated?
11. How should the standards encourage high expectation and high achievement? Should they be minimum expectations for every individual or should they be more demanding? How should they convey the importance of stretching students to go beyond the standards and how should they encourage this?

c. Scope and Sequence

12. Should the scope and sequence of each subject be set out in a separate document, distinct from the standards? A scope and sequence document that also describes the level of performance expected of learners would be a combination of scope and sequence and standards. Would this be a desirable way to reduce the volume of, and hence clarify, the documentation?
13. What is the best way to present the scope and sequence so that teachers and other stakeholders can easily recognize progression in terms of subject development and the degree of challenge learners face as they mature?
14. How can cross-links between different subjects be emphasised so that, as far as possible, teaching and learning is integrated across subject boundaries and learners are encouraged to recognise interconnections between different subjects?
15. What is the right balance in terms of the amount of detail in the scope and sequence document? It is important that all the necessary detail is included at the next level, that of the syllabuses. However, too much detail in the scope and sequence document is likely to defeat the purpose of clearly explaining the big picture regarding coverage and progression.

5. Decision-making Regarding Curriculum Design and Content

Subjects remain the principal means of categorizing curriculum content in jurisdictions all over the world and decisions about what should be included are naturally the domain of subject experts.

However, it is essential that subject experts are committed to a common set of principles so that the final product is clearly identifiable as a coherent and cohesive curriculum that is more than the sum of its subject parts. Hence there is a need for a strategic core team with responsibility for developing the principles and for ensuring that they are understood and adhered to by the subject experts.

a. The Core Team

The precise composition of the core team is a decision for leaders in each jurisdiction but as it is normally shaped by the fact that it has both a strategic function and a coordinating role. Members usually fall into two categories:

- Curriculum leaders with overall responsibility for the process
- Subject specialists who will interact with and / or be members of subject teams

Core teams are often composed largely of Ministry personnel.

b. Subject Teams

A crucial decision that curriculum developers have to make regards the make up of each subject team. Factors that are usually taken into account include the following.

- Team leadership: All subject teams need a respected leader with all the associated leadership qualities who can maintain a strong and productive team and make final decisions when team members disagree.
- The balance of academics and practitioners: Both have an important role with teachers bringing experience of child development and what is realistic at different stages while academics provide the research evidence and an understanding of the needs of Higher Education.
- The balance of philosophies that aligns with overall curriculum principles: Any group will include a range of people who might be broadly categorized as a mix of traditionalists and modernisers. It is essential that consideration is given to establishing a balance that is right for achieving the intended outcome at the end of the curriculum review process.
- The scope of the subject: Core subjects such as mathematics, national language and science are usually taught throughout the age range and occupy a large proportion of curriculum time so there will normally be a need for sub-teams for different phases (e.g. pre-primary, lower and upper primary, lower and upper secondary). Other subjects are either not taught in all phases or have a small percentage of curriculum time, in which case the team can be smaller and may not require sub-dividing. If there are to be sub-teams, the role of coordination to ensure progression between phases will be important.
- The overall size of the team: If the team is too small it may not have the capacity to complete the task in time but if it is too large it could be impossible to involve every member effectively and it will be unproductive.

c. Guidance for Subject Teams Regarding Content

The core team's role is ensuring that all subjects contribute appropriately to the curriculum as a whole involves them providing guidance with respect to the vision,

the aims and values, the generic competences, the cross-cutting issues (important learning that is not the domain of any particular subject) and the attitudes the curriculum should engender.

A common theme in curriculum review in recent years has been the drive to reduce curriculum overload. The need for this derives partly from the fact that over time a process of ‘curriculum inflation’ takes place, with new content being gradually added without a corresponding removal of superfluous content.

Teachers around the world report that the curriculum includes far too much for them to teach in the time available and that they therefore have to be selective with respect to what can be covered.

This situation, coupled with the trend towards curricula which are more competency-based and less knowledge-based, means that there is normally a need to reduce the amount of content when developing a modern curriculum. This can be particularly challenging for those with a narrow subject background.

The core team can establish that this reduction in knowledge content should be a guiding principle of curriculum design but cannot direct subject specialists with respect to precisely what content should be included or excluded. The role of the subject specialist members of the core team is pivotal in ensuring that subject teams understand the need for this principle and adhere to it.

Typically, and depending on evidence gathered from the field relating to the curriculum for each subject, the guiding principle regarding content might be that subject teams should reduce the size of the curriculum by a percentage. Faced with the challenge of reducing content by, for example, 20%, subject teams then have to make difficult decisions in answer to questions such as:

- What are the key concepts and principles that all learners must understand?
- What topics could be considered as ‘depth’ that will stretch more able learners but that are not necessarily essential learning for all?
- To what extent can slimming down be achieved by trimming some detail from topics across the whole curriculum?
- Are there any whole sections of the curriculum that can be removed because, for example, they have become obsolete or they consume too much teaching time for little return in terms of key learning?
- What will be removed to make way for any new learning that needs to be added to the curriculum?
- To what extent can savings be made by removing duplication so that different subjects do not repeat the same learning?

Subject team members inevitably have important and robust conversations about these difficult issues. In some cases, team leaders have to make final decisions. This slimming down of the curriculum is often an iterative process to ensure that the outcome is not an overloaded curriculum.

National Curriculum documents from countries that have carried out recent reviews provide valuable international evidence with regard to content norms.

6. Subject Analysis

The following pages capture the analysis of the national standards for national language, mathematics and science and of the scope and sequence of the selected countries.

Subject teams will find that these provoke debate and lead to some deep questions being explored about a range of issues including how we prepare learners for taking their place in today's society and for their role in helping the nation compete successfully in the global economy.

The analysis shows that different nations come to different conclusions about curriculum design and develop their own solutions accordingly. It suggests that there is no right way but that each country should draw on best practice and find its own solution for circumstances prevailing at the time.

Each analysis provokes high-level questions relating to the philosophy of the subject and to the structure of the curriculum to ensure that essential principles and concepts are taught appropriately and covered at the right developmental stage for learners. Grouping of subjects and topics within them into logical strands or sub-strands (or whatever terminology is agreed) is critical in this respect.

Other important issues will need to be explored such as how progression is built into the subject curriculum and how an appropriate balance is achieved between sufficient detail and curriculum overload.

A key strategy for success will be to ensure that subject teams devote sufficient time to reaching agreement and a common understanding regarding curriculum principles and structure before writing begins so that all work is channeled and productive.

The subject analyses are presented on the following pages:

a. National Language
    i. Standards
    ii. Scope and Sequence

b. Mathematics
    iii. Standards
    iv. Scope and Sequence

c. Science
    v. Standards
    vi. Scope and Sequence

6a.i. National Language Standards

Basic structure of the standards

Australia

- Australia's standards are directly linked to curriculum.
- For the purposes of measuring more holistic progress the three strands of the curriculum (Language, Literature, Literacy) have been divided into two modes; the receptive mode includes reading, listening and viewing and the productive mode covers speaking, writing and creating.
- There are therefore two separate standards for each year from foundation to year 10.
- The condensing of standards into just two modes would seem to make it more manageable.
- Portfolios containing annotated samples of work (written and recorded) for each year are available at three levels (satisfactory, above satisfactory, below satisfactory)

USA

- The USA common core is a relatively complex model. For the purposes of this paper both the College and Career Ready (CCR) anchor standards are included with the progression table from kindergarten to Y12.
- As explained above, there is no USA common core curriculum. The common core is a set of standards which have been mapped backwards from the 32 College and Career Ready anchor standards, which describe what a student should be able to do at the end of their schooling. There are written 'core' standards for every grade, from Kindergarten to grade 12. Each grade represents a year of schooling.
- There are also "learning to read" standards called Reading Foundational Skills.
- The core is divided into six strands (Reading literature, Reading informational text, Reading foundational texts, Writing, Speaking and Listening, Language). Each strand has a number of clusters. The standards written for each cluster make the core standards for that strand and for that particular grade. Some of these standards have additional indicators. No grade has more than five indicators; some have fewer.
- The standards for G9-12 are banded into grade bands of 9-10 and 11-12 to offer some additional flexibility.
- Annotated samples demonstrating 'adequate' performance in writing at various grade levels are available to support assessment.

Chile

- There are no agreed achievement standards to use alongside the current national curriculum of Chile, although, as explained above, the scope and sequence documents are referred to as standards. There are learning objectives and agreed expectations for each objective.
- The progress maps or band level descriptors included in this research are no longer approved for use with the current curriculum. However they represent a possible 'third way' of presenting standards.
- The curriculum and the progress maps are set out in the same way with three strands: Reading and writing are separate strands and listening and speaking are grouped together under the title *oral communication*.
- The ladder of levels in the progress maps sets out what might be expected at the end

of each two-year period from Primary 1 to Secondary 2, thus allowing greater flexibility. There is an 'exceptional performance' descriptor at age 16 for students who achieve well above expectation.

- Annotated samples are provided, demonstrating achievement at each level.

Because of the wide variation in the manner in which the standards for the national language are set out, the analysis below is presented in three separate tables, one for each country.

Australia

Year	Receptive modes (listening, reading, viewing)	Productive modes (speaking, writing, creating)
F	Use predicting and questioning strategies to make meaning from texts. Recall one or two events from texts with familiar topics. Understand that there are different types of texts and that these can have similar characteristics. Identify connections between texts and their personal experience. Read short, predictable texts with familiar vocabulary and supportive images, drawing on their developing knowledge of concepts about print and sound and letters. Identify the letters of the English alphabet and use the sounds represented by most letters. Listen to and use appropriate language features to respond to others in a familiar environment. Listen for rhyme, letter patterns and sounds in words.	Understand that texts can reflect their own experiences. Identify and describe likes and dislikes about familiar texts, objects, characters and events. In informal group and whole class settings, communicating clearly. Retell events and experiences with peers and known adults. Identify and use rhyme, letter patterns and sounds in words. When writing, use familiar words and phrases and images to convey ideas. Write showing evidence of sound and letter knowledge, begin writing behaviours and experimentation with capital letters and full stops. Correctly form known upper- and lower-case letters.
1	Understand the different purposes of texts. Make connections to personal experience when explaining characters and main events in short texts. Identify the language features images and vocabulary used to describe characters and events. Read aloud, with developing fluency and intonation, short texts with some unfamiliar vocabulary, simple and compound sentences and supportive images. When reading, use knowledge of sounds and letters, high frequency words, sentence boundary punctuation and directionality to make meaning. Recall key ideas and recognise literal and implied meaning in texts. Listen to others when taking part in conversations, using appropriate language features. Listen for and reproduce letter patterns and letter clusters.	Understand how characters in texts are developed and give reasons for personal preferences. Create texts that show understanding of the connection between writing, speech and images. Create short texts for a small range of purposes. Interact in pair, group and class discussions, taking turns when responding. Make short presentations of a few connected sentences on familiar and learned topics. When writing, provide details about ideas or events. Accurately spell words with regular spelling patterns and use capital letters and full stops. Correctly form all upper- and lower-case letters.
2	Understand how similar texts share characteristics by identifying text structures and language features used to describe characters, settings and events. Read texts that contain varied sentence structures, some unfamiliar vocabulary, a significant number of high frequency sight words and images that provide additional information. Monitor meaning and self-correct using context, prior knowledge, punctuation, language and phonic knowledge. Identify literal and implied meaning, main ideas and supporting detail. Make	When discussing ideas and experiences, use everyday language features and topic-specific vocabulary. Explain their preferences for aspects of texts using other texts as comparisons. Create texts that show how images support the meaning of the text. Create texts, drawing on their own experiences, their imagination and information they have learned. Use a variety of strategies to engage in group and class discussions and make presentations. Spell familiar words accurately and attempt to spell less familiar words and use punctuation accurately.

	connections between texts by comparing content. Listen for particular purposes. Listen for and manipulate sound combinations and rhythmic sound patterns	Legibly write unjoined upper- and lower-case letters.
3	Understand how content can be organised using different text structures depending on the purpose of the text; how language features, images and vocabulary choices are used for different effects. Read texts that contain varied sentence structures, a range of punctuation conventions, and images that provide additional information. Identify literal and implied meaning connecting ideas in different parts of a text. Select information, ideas and events in texts that relate to their own lives and to other texts. Listen to others' views and respond appropriately.	Understand how language features are used to link and sequence ideas; how language can be used to express feelings and opinions on topics. Produced texts include writing and images to express and develop in some detail experiences, events, information, ideas and characters. Create a range of texts for familiar and unfamiliar audiences. Contribute actively to class and group discussions, asking questions, providing useful feedback and making presentations. Demonstrate understanding of grammar and choose vocabulary and punctuation appropriate to the purpose and context of own writing. Use knowledge of sounds and high frequency words to spell words accurately, checking work for meaning. Write using joined letters, accurately formed and consistent in size.
4	Understand that texts have different text structures depending on purpose and audience. Explain how language features, images and vocabulary are used to engage the interest of audiences. Describe literal and implied meaning connecting ideas in different texts. Express preferences for particular texts, and respond to others' viewpoints. Listen for key points in discussions.	Use language features to create coherence and add detail to their texts. Understand how to express an opinion based on information in a text. Create texts that show understanding of how images and detail can be used to extend key ideas. Create structured texts to explain ideas for different audiences. Make presentations and contribute actively to class and group discussions, varying language according to context. Demonstrate understanding of grammar, select vocabulary from a range of resources and use accurate spelling and punctuation, editing their work to improve meaning.
5	Explain how text structures assist in understanding the text. Understand how language features, images and vocabulary influence interpretations of characters, settings and events. Analyse and explain literal and implied information from a variety of texts. Describe how events, characters and settings in texts are depicted and explain their own responses to them. Listen and ask questions to clarify content.	Use language features to show how ideas can be extended. Develop and explain a point of view about a text, selecting information, ideas and images from a range of resources. Create a variety of sequenced texts for different purposes and audience. Make presentations and contribute actively to class and group discussions, taking into account other perspectives. When writing, demonstrate understanding of grammar, select specific vocabulary and use accurate spelling and punctuation, editing work to provide structure and meaning.
6	Understand how the use of text structures can achieve particular effects. Analyse and explain how language features, images and vocabulary, are used by different authors to represent ideas, characters and events. Compare and analyse information in different texts, explaining literal and implied meaning. Select and use evidence from a text to explain own response to it. Listen to discussions, clarifying content and challenging others' ideas.	Understand how language features and language patterns can be used for emphasis. Show how specific details can be used to support a point of view. Explain how their choices of language features and images are used. Create detailed texts elaborating on key ideas for a range of purposes and audiences. Make presentations and contribute actively to class and group discussions, using a variety of strategies for effect. Demonstrate understanding of grammar, make considered choices from an expanding vocabulary, use accurate spelling and punctuation for clarity and make and explain editorial choices.
7	Understand how text structures can influence the complexity of a text and are dependent on audience, purpose and context. Demonstrate	Understand how the selection of a variety of language features can influence an audience; how to draw on personal knowledge, textual analysis

	understanding of how the choice of language features, images and vocabulary affects meaning. Explain issues and ideas from a variety of sources, analysing supporting evidence and implied meaning. Select specific details from texts to develop own response, recognising that texts reflect different viewpoints. Listen for and explain different perspectives in texts.	and other sources to express or challenge a point of view. Create texts showing how language features and images from other texts can be combined for effect. Create structured and coherent texts for a range of purposes and audiences. Make presentations and contribute actively to class and group discussions, using language features to engage the audience. When creating and editing texts demonstrate understanding of grammar, use a variety of more specialised vocabulary, accurate spelling and punctuation.
8	Understand how the selection of text structures is influenced by the selection of language mode and how this varies for different purposes and audiences. Explain how language features, images and vocabulary are used to represent different ideas and issues in texts. Interpret texts, questioning the reliability of sources of ideas and information. Select evidence from the text to show how events, situations and people can be represented from different viewpoints. Listen for and identify different emphases in texts, using that understanding to elaborate upon discussions.	Understand how the selection of language features can be used for particular purposes and effects. Explain the effectiveness of language choices they use to influence the audience. Through combining ideas, images and language features from other texts, show how ideas can be expressed in new ways. Create texts for different purposes, selecting language to influence audience response. Make presentations and contribute actively to class and group discussions, using language patterns for effect. When creating and editing texts to create specific effects, take into account intended purposes and the needs and interests of audiences. Demonstrate understanding of grammar, select vocabulary for effect and use accurate spelling and punctuation.
9	Analyse the ways that text structures can be manipulated for effect; analyse and explain how images, vocabulary choices and language features distinguish the work of individual authors. Evaluate and integrate ideas and information from texts to form own interpretations. Select evidence from the text to analyse and explain how language choices and conventions are used to influence an audience Listen for ways texts position an audience.	Understand how to use a variety of language features to create different levels of meaning; understand how interpretations can vary by comparing own responses to texts to the responses of others. In creating texts, demonstrate how manipulating language features and images can create innovative texts. Create texts that respond to issues, interpreting and integrating ideas from other texts. Make presentations and contribute actively to class and group discussions, comparing and evaluating responses to ideas and issues. Edit for effect, selecting vocabulary and grammar that contribute to the precision and persuasiveness of texts and using accurate spelling and punctuation.
10	Evaluate how text structures can be used in innovative ways by different authors. Explain how the choice of language features, images and vocabulary contributes to the development of individual style. Develop and justify own interpretations of texts. Evaluate other interpretations, analysing the evidence used to support them. Listen for ways features within texts can be manipulated to achieve particular effects.	Show how the selection of language features can achieve precision and stylistic effect. Explain different viewpoints, attitudes and perspectives through the development of cohesive and logical arguments. Develop own style by experimenting with language features, stylistic devices, text structures and images. Create a wide range of texts to articulate complex ideas. Make presentations and contribute actively to class and group discussions, building on others' ideas, solving problems, justifying opinions and developing and expanding arguments. Demonstrate understanding of grammar, vary vocabulary choices for impact, and accurately use spelling and punctuation when creating and editing texts.

USA

College And Career Readiness Anchor Standards for Language

Reading		**Writing**	**Speaking And Listening**	**Language**	Stra
Literature	**Informational Text**				
Key Ideas And Details		Text types and purposes	Comprehension and Collaboration	Conventions of Standard English	Cluster
1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.		1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.	1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas		2.Write informative /explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization and analysis of content	2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally	2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing	
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.		3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences	3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric		Standards
Craft And Structure		Production and distribution of writing	Presentation of Knowledge and Ideas	Knowledge of Language	Cluster
4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.		4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.	3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.	
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (section, chapter, scene, or stanza) relate to each other and the whole.		5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.	5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.		
6. Assess how point of view or purpose shapes the content and style of a text.		6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others	6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate		Standards
Integration Of Knowledge And Ideas		Research to Build and Present Knowledge		Vocabulary Acquisition and Use	Cluster
7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.		7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.		4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.	
	8. Delineate	8. Gather relevant information		5. Demonstrate	Standards

	and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.	from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.		understanding of figurative language, word relationships, and nuances in word meanings.	
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.		9. Draw evidence from literary or informational texts to support analysis, reflection, and research		6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression	
Range Of Reading And Level Of Complexity		Range of writing			Cluster
10. Read and comprehend complex literary and informational texts independently and proficiently.		10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.			Standard

Chile

Level	Reading	Production of written texts (Writing)	Oral communication (Speaking and Listening)
1	Read short and simple real or imaginary texts which include familiar words and phrases. Extract key points and understand begin to infer. Understand the overall meaning of a text from key information in it. Give views on a text using information and clues in the text.	Write short texts on familiar contexts. Communicate opinion or feelings, using common vocabulary. Write well-constructed phrases and simple sentences legibly, leaving spaces between words.	Speak audibly and clearly in different situations. Relate personal news, experiences and stories, with coherence and cohesion and take part in dialogues. Listen sympathetically to short, simple stories and recall key points. Understand the importance of taking turns, show respect for other's views and an awareness of the communicative process.
2	Read widely, simple fiction and non-fiction containing some unfamiliar language. Identify the main points and some additional information. Draw inferences from the text referring to cause, effect and sequence. Work out the overall message of the text from what is stated and implied. Comment on the text based on extracted information.	Write short real and imaginary texts to narrate and describe events or express feelings and opinions. Organise ideas or information on a central theme, using a range of frequently used vocabulary. Use simple and compound sentences respecting simple spelling rules. Writing is legible	Listen to information from various sources in groups and alone. Recount simple stories. Respect the rules of conversations, discussions and group work. Present short well constructed informative talks
3	Read a wide range of texts of different structures and topics including a few with more complex language elements and ideas. Distinguish the main points and secondary details. Draw inferences from a text using evidence of cause, effect and sequence to explain. Understand the global meaning of a text based on information extracted. Give one's view on various aspects of a text drawing what is stated and implied and integrating own knowledge about the subject	Write real and imaginary texts to narrate, describe and explain events or express feelings and opinions. Organise ideas or information on a central theme, supported by some additional ideas, using varied vocabulary. Write sentences that include common coordinating and subordinating conjunctions, main tenses and modes, respecting simple punctuation and accurately spelling most words.	Listen and identify feelings and points of views. Argue convincingly and present and support a personal viewpoint on a given theme. Select correct register for the situation. Take part in discussions including those about current media issues. Conduct simple interviews about self and community. Give a simple informative talk.

4	Read a wide range of texts of different structures and topics which include a number with more complex language elements and ideas. Extract the key points and the complementary information confirming or emphasising the main ideas. Understand the relationship between the parts of a text and the details in it, to its overall meaning. Comment on texts read, comparing the sociocultural context presented in the text with contemporary or own experience.	Write real and imaginary texts to express, narrate, describe and explain. Organise ideas or information on a central theme, supported by complementary ideas, connecting them appropriately and using a varied vocabulary relevant to the context and purpose. Write sentences that include common coordinating and subordinating conjunctions, main tenses and modes, and accurate, accented spellings.	Take part in discussions, conversations, debates , forums , etc. persuading others through logical arguments. Participates in forums, debates and interviews as a listener and report back. Narrate different types of fiction and non-fiction using register and vocabulary appropriate to the situation. Role play characters in their historical and social context
5	Read a wide range of texts of different structures and topics which include a variety of more complex language elements and ideas. Understand the overall meaning taking into account alternative interpretations. Evaluate texts read comparing own and other's interpretations and opinions.	Write different types of texts to express, narrate, describe, explain and argue. Develop ideas and convey information around a central theme. Link paragraphs and use varied, precise and relevant vocabulary to good effect relevant to context, purpose and audience. Write various types of phrases and sentences demonstrating good knowledge of language structures and grammar and respecting the conventions of presentation of different text types.	Take part in a range of interactions contributing simple dialogues on familiar issues. Understand the value of the communicative process in conveying information about people and their context. Appreciate the importance of interpersonal relationships and how oral communication influences people.
6	Read a wide range of texts that provide opportunities to experience different world-views. Analyse texts drawing on complex inferences gathering further information about the sociocultural context in which they are written. Identify the linguistic techniques used to enhance the writing. Evaluate the validity of arguments or approaches in the texts.	Write different types of texts to express, narrate, describe, explain and argue. Develops ideas around a central theme, writing analytically and critically. Select expressive and cohesive language devices, and use varied, precise vocabulary relevant to context, purpose and audience. Use conventions of presentation; design and edit various text types.	Take part in interactions that require disagreement, such as debates, forums, discussions, etc. Analyse oral communication dealing with controversial issues, expressing a personal view. Organise talk clearly and logically to communicate in public. Analyse and explain controversial themes in the mass media.

7 (exceptional)	Study and analyse a wide range of different types of text. Interpret and reinterpret a text and unravel the overall meaning looking at emphasis, nuance, ambiguities, contradictions or unclear positions. Evaluate the quality of text and the relevance of its structure, style and coherence.	Write different types of texts to express, narrate, describe, explain and argue. Develops ideas around a central theme writing analytically, critically and/ or creatively. Select expressive and cohesive language devices. Write flexibly showing a clear grasp of language conventions, presentation; design and edit text, demonstrating understanding of the characteristics of different text types and stylistic purposes.	Talk about values and thoughts obtained from analysis of reading. Participate in debates, forums and discussions, concerned with the problems of today's world. Critically analyse and sustain discussion about the messages delivered by the mass media.

6a.ii National Language Scope and Sequence

Basic structure of the content

- Curricula for literacy are usually process orientated and this leads to a wider variation in structure across countries than for science and maths where the topic-based content results in more commonality.
- The Australian curriculum includes a rationale, aims, year level descriptions, information on the structure of the curriculum, content elaborations, annotated portfolios of student work samples and a glossary.
- The USA common core, although not a national curriculum, has a clear rationale, year and upper secondary band descriptors, some content elaboration for reading (range and complexity of texts) and a glossary.
- The Chilean curriculum is more 'objective driven', specifying number of hours for each unit, and detailed objectives for students supported by extensive content elaboration, recommended texts and resource lists, and end of unit expectations. There is a clear curriculum rationale, a clear structure, suggested assessment activities and criteria for success.

Comparison of content

Australia	Language Literature Literacy	Literacy skills
USA	Reading literature Reading informational text Reading foundational texts Writing Speaking and Listening Language	Language modes and purposes of literacy
Chile	Reading Writing Oral communication	Language modes

- The nature of language and literacy underlie the considerable differences seen above. Unlike mathematics and science, the subject is less susceptible to be structured according to content. In the absence of this organising principle, language modes, literacy skills or sometimes the purposes of literacy might all structure the classification within the curriculum.
- The **scope and sequence** table below is an attempt to capture similarities in terms of content. All curricula acknowledge the importance of the four modes (reading, writing, speaking and listening) though the balance is different in the three countries. The knowledge of language strand is overt in Australia and USA but integrated into the four modes in Chile. Literature is a distinctive strand in USA and Australia but integrated in Chile.
- In all three countries it is acknowledged that literacy learning is recursive and cumulative, and builds on concepts, skills and processes developed in earlier years. The descriptions or objectives have been written to ensure that learning is appropriately ordered and that unnecessary repetition is avoided. However, a concept or skill introduced in one year may be revisited, strengthened and extended at later year levels as needed. Language progressive skills likely to require continued attention are flagged in the USA Common core.
- There is a tendency for a literacy curriculum to be inclusive and integrated rather than highly differentiated. In Australia the student diversity statement recognizes the need for teachers to personalize the curriculum and identifies students with a disability, those who are gifted and

talented and students with a different home language/dialect. In Chile and the USA teachers are encouraged to include all pupils with modifications and adaptations where necessary for special needs. All curricula emphasise working together and USA common core highlights the importance of peer and adult support

- The primacy of reading, particularly in USA and Chile, is very apparent. A significant shift in the USA core is acknowledged as a new balance of informational versus literary texts. All three countries specify the skills involved in full comprehension and analysis of texts, with inference and deduction starting very early in Chile. Looking for meaning beyond the literal, looking for connections and using knowledge of other texts students have read are features of learning in all countries. The development of academic vocabulary and 'high octane' (sophisticated) words which give students access to complex texts is underlined in USA and Australia. Reading attitudes, such as using the library are also emphasized in the Chilean curriculum.
- The choice of reading material reflects the general philosophy and ethos: In USA 'critical content' prescribes classic mythology, foundational US documents and Shakespeare while Australia includes literature from other cultures including Aboriginal and Torres Strait Islander authors.
- Writing from sources, using evidence to persuade and to justify are found in all three curricula.
- Literacy knowledge in subjects beyond the home language (English), and reading informational texts are prioritized in the USA common core.
- Visual communication within the curriculum is particular to Australia

Difficulty and breadth

- Comparisons of difficulty and breadth across the three curricula are not easy, for a number of reasons. Firstly, the difference in curriculum structure makes it hard to match the content itself. Further, the difficulty in terms of the age at which distinct skills and understandings are taught is sometimes not discernible. There is an additional factor in literacy, however, which is that the difficulty of a reading or listening task depends upon what is read, viewed or listened to.
- Resources for reading are undefined in Australia. Recommended readers and reading lists are a feature of the Chilean curriculum. It has to be assumed that reading materials selected are generally appropriate for their age group. USA common core acknowledges the importance of this challenge. A positive feature is the detailed advice and guidance about text range, quality and complexity. These sample texts demonstrate the level of text complexity appropriate for the grade level, compatible with the learning demands set out in the standards.
- The curricula for each country in terms of language demands in reading, writing, speaking and listening appear to be broadly comparable.

Because of the diversity in terms of the structure of the national language curriculum in each country, the table below details the Australian curriculum coverage and then includes ticks (✔) to show where there is a high degree of alignment in USA or Chile.

National Language Scope and Sequence for the Australian curriculum. High degree of match (✔) indicated for USA and Chile.

Australia	**USA (Common Core)**	**Chile**
The two columns below show the structure and content of the national curriculum. Where a particular element is covered over a narrow range of years this is indicated.	There is no curriculum. The nature of the standards signposts what needs to be taught. States that adopt the common core are free to develop their own 'content-rich curriculum consistent with the expectations'. The	The curriculum for each of the 8 grades is divided into 4 units. Each unit has a prescribed number of hours and is split into a series of learning objectives with resources. The three strands of reading, writing and oral

			standards stress critical-thinking, problem-solving, and analytical skills. There are standards for English language arts as well as separate standards for literacy in history/social studies, science, and technical subjects in preparation for college and career readiness.	communication are integrated in teaching and learning in order to support the development of knowledge, understanding and skills. The focus on developing skills through reading is very evident.
Language Strand Sub strands and threads (within the sub strand)	Approaches draw attention to the ways in which languages change, and to the distinction between language-in-use and language-as-system and acknowledge that students' ability to use grammar will exceed their ability to explicitly reflect on it. In describing language, the curriculum also pays attention to both the structure (syntax) and meaning (semantics) at the level of the word, the sentence and the text		The Language strand is included from Kindergarten through to grade 12 and is divided into three sub strands or 'clusters': **Conventions of standard English** which includes word level grammar, punctuation **Vocabulary acquisition and use** includes morphology, use of reference materials **Knowledge of language** from grade 2 Print concepts and phonological awareness are included in the reading foundational skills strand from K-G5	No separate knowledge of language strand. However phonology, decoding of language and vocabulary acquisition feature as sub-strands of reading and command of language is a feature of writing.
Language variation and change	How language varies according to context (inc cultural and historical) and purpose			
Language for interaction	Language for social interactions		✔	✔
	Evaluative language			
Text structure and organisation	Purpose, audience and structures of different text types		✔	✔
	Text cohesion		✔	✔
	Punctuation		✔	✔
	Concepts of print and screen	Starts Foundation and ends Y5.		
Expressing and developing ideas	Sentences and clause level grammar		✔	✔
	Word level grammar		✔	✔
	Visual language		Other countries do not include visual communication	
	Vocabulary		✔	
	Spelling		✔	✔
Sound and letter knowledge	Phonemic awareness (sounds of language)	Starts Foundation and ends Y2	✔ Ends G5	✔Ends Y1
	Alphabet knowledge	Starts foundation and ends Y1	✔ Ends G5	✔Ends Y1

Literacy Strand Sub strands and threads (within the sub strand) Speaking and listening are treated together as are the productive modes speaking and writing. Reading is dealt with separately	**Australia** The approach takes account of development of skills to communicate in order to play a full part in society: Fluency in the sound–letter correspondences of English. An expanding reading, writing and speaking vocabulary and a grasp of grammatical and textual patterns sufficient to understand and learn from texts encountered in and out of school, and to create effective and innovative texts. Fluency and innovation in reading, viewing and creating texts in different settings. The skill to analyse and understand the philosophical, moral, political and aesthetic bases on which many texts are built. An interest in expanding the range of materials listened to, viewed and read, and in experimenting with innovative ways of expressing increasingly subtle and complex ideas through texts		**USA (Common Core)** The main thrust of the USA common core is Reading, writing, speaking and literacy though there is a significant shift where informational texts are given the same priority as literary texts and cross-curricular literacy responsibilities for literacy are defined	**Chile** There is no separate literacy strand.
Texts in context	Texts and their contexts		✔	
Interacting with others	Listening and speaking interactions (purposes and contexts)		✔	✔
	Listening and speaking interactions (skills)		✔	✔
	Oral presentations		✔	✔
Interpreting, analyzing, evaluating	Purpose and audience		✔	
	Reading processes		✔	
	Comprehension strategies		✔	
	Analysing and evaluating texts	Starts Y6	✔	
Creating texts	Creating spoken, written and multi modal texts using knowledge of structure and language features	Starts foundation and ends Y2	✔	
	Editing texts for meaning, structure and grammar	Starts foundation and ends Y1	✔	✔
	Handwriting	Starts in foundation with learned letter formations, joined letters consistent size from Y3 and		✔

		ends Y8		
	Use of software		✔	✔

Literature Strand Sub strands and threads (within the sub strand)	Australia The different ways in which literature is significant in everyday life, close analysis of literary works and the key ideas and values on which they are based; comparisons of works of literature from different language; ethnic and cultural backgrounds, historical study of the origins, authorship, readership and reception of texts; exploration of the relationships between historical, cultural and literary traditions.		USA (Common Core) Literary texts and informational texts have equal status in the standards. The common core document includes recommended grade specific texts. The Reading sub-strands or clusters are key ideas and details, craft and structure, integration of knowledge and ideas, range of reading level and complexity.	Chile Literature is not separated out but integrated in all three strands. The curriculum includes a wide range of reading materials.
Literature and context	How texts reflect the context of culture and situation in which they are created		✔	✔
Responding to literature	Personal responses to ideas, characters and view points		✔	✔
	Expressing preferences and evaluating texts		✔	✔
Examining Literature	Features of literary texts		✔	
	Language devices in literary texts including figurative language	Starts foundation replicating rhythms and sound patterns in stories, songs and poems	✔	✔
Creating Literature	Creating own literary texts based on ideas, features and structures experienced			✔
	Experimentation and adaptation	From Y3 starting with creating texts that adapt language features/ patterns		

6b.i Mathematics – National Standards

The national standards in US and Australia are set out year by year, starting in the Foundation / Kindergarten stage. The Ausralian standards are very similar to the sequence and scope.
Chile's progress maps outline expected progress but are not described as standards. They begin at Grade 1 and are set out by levels, which are intended to approximate to two years of 'average progress' but this alignment is not rigid. There are seven levels, allowing greater flexibility at higher grades so that some learners can make more accelerated progress.

	Australia (year)	USA (Common Core) (grade overviews)	Chile (level from progress map)
Foundation / Kindergarten	By the end of the Foundation year, students make connections between number names, numerals and quantities up to 10. They compare objects using mass, length and capacity. Students connect events and the days of the week. They explain the order and duration of events. They use appropriate language to describe location. Students count to and from 20 and order small collections. They group objects based on common characteristics and sort shapes and objects. Students answer simple questions to collect information.	Counting and Cardinality • Know number names and the count sequence. • Count to tell the number of objects. • Compare numbers. Operations and Algebraic Thinking • Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Number and Operations in Base Ten • Work with numbers 11–19 to gain foundations for place value. Measurement and Data • Describe and compare measurable attributes. • Classify objects and count the number of objects in categories. Geometry • Identify and describe shapes. • Analyze, compare, create, and compose shapes. Mathematical Practices 1-8 (common to all grades) 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	Not applicable
1	By the end of Year 1, students describe number sequences resulting from skip counting by 2s, 5s and 10s. They identify representations of one half. They recognise Australian coins according to their value. Students explain time durations. They describe two-dimensional shapes and three-dimensional objects. Students describe data displays. Students count to and from 100 and locate numbers on a number line. They carry out simple additions and subtractions using counting strategies. They partition numbers using place value. They continue simple patterns involving numbers and objects. Students order objects based on lengths and capacities using informal units. They tell time to the half hour. They use the language of direction to move from place to place. Students	Grade 1 Overview Operations and Algebraic Thinking • Represent and solve problems involving addition and subtraction. • Understand and apply properties of operations and the relationship between addition and subtraction. • Add and subtract within 20. • Work with addition and subtraction equations. Number and Operations in Base Ten • Extend the counting sequence. • Understand place value. • Use place value understanding and properties of operations to add and subtract. Measurement and Data • Measure lengths indirectly and by iterating length units. • Tell and write time. • Represent and interpret data. Geometry • Reason with shapes and their attributes.	Level 1: Number and Operations Use the natural numbers up to 1000 to count, sort, compare, estimate and calculate quantities of objects and magnitudes. Understand that the position of the digit, in numbers, determines its value. Make additions and subtractions understanding the meaning of these operations and the relationship between them, and use them to establish relations of order. Recognise that the natural numbers can be expressed as addition or subtraction of two or more natural numbers, particularly decomposition into hundreds, tens and units. Make mental calculation of additions and subtractions requiring simple strategies with numbers less than 100. Solve problems in familiar contexts, in which the data is explicit. Describe the strategy used

	classify outcomes of simple familiar events. They collect data by asking questions and draw simple data displays.	Mathematical Practices 1-8	and communicate their results concerning the problem context. Level 1: Algebra Understand that the equals sign is an equality between two expressions and recognise that symbols can represent numerical values. Determine the unknown value in addition and subtraction situations. Continue development of numerical and geometric patterns, given the generating rule. Determine whether a numerical term belongs to a sequence or not referring to a given rule. Level 1: Geometry Identify properties of plane figures and prisms including parallel and perpendicular faces and edges. Identify them in the environment. Understand the concept of measurement, estimate and measure lengths using informal and standard units of measurement, and interpret information regarding lengths in different contexts. Formulate and verify conjectures, and solve problems in shape and space, including determination of lengths. Level 1: Statistics and probability Organise simple data about objects, people or animals into simple tables, lists and pictograms. Extract information from tables and pictograms related to familiar contexts. Make simple comparisons with data extracted from tables and pictograms and justify conclusions based on the information provided.
2	By the end of Year 2, students recognise increasing and decreasing number sequences involving 2s, 3s and 5s. They represent multiplication and division by grouping into sets. They associate collections of Australian coins with their value. Students identify the missing element in a number sequence. Students recognise the features of three-dimensional objects. They interpret simple maps of familiar locations. They explain the effects of one-step transformations. Students make sense of collected information. Students count to and from 1000. They perform simple addition and subtraction calculations using a range of strategies. They divide collections and shapes into halves, quarters and eighths. Students order shapes and objects using informal units. They tell time to the quarter hour and use a calendar to identify the date and the months included in seasons. They draw two-dimensional shapes. They describe outcomes for everyday events. Students collect data from relevant questions to create lists, tables and picture graphs.	Grade 2 Overview Operations and Algebraic Thinking • Represent and solve problems involving addition and subtraction. • Add and subtract within 20. • Work with equal groups of objects to gain foundations for multiplication. Number and Operations in Base Ten • Understand place value. • Use place value understanding and properties of operations to add and subtract. Measurement and Data • Measure and estimate lengths in standard units. • Relate addition and subtraction to length. • Work with time and money. • Represent and interpret data. Geometry • Reason with shapes and their attributes. Mathematical Practices 1-8	
3	By the end of Year 3, students recognise the connection between addition and subtraction and solve problems using efficient strategies for multiplication. They model and represent unit fractions. They represent money values in various ways. Students identify symmetry in the environment. They match positions on maps with given information. Students recognise angles in real situations. They interpret and compare data displays. Students count to and from 10 000. They classify numbers as either odd or even. They recall addition and	Grade 3 Overview Operations and Algebraic Thinking • Represent and solve problems involving multiplication and division. • Understand properties of multiplication and the relationship between multiplication and division. • Multiply and divide within 100. • Solve problems involving the four operations, and identify and explain patterns in arithmetic. Number and Operations in Base Ten • Use place value understanding and properties of operations to perform multi-digit arithmetic. Number and Operations—Fractions	Level 2: Number and Operations Use the natural numbers up to 1 000 000 to count, sort, compare , estimate and calculate. Understand simple fractions ($\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{8}, \frac{3}{4}, \frac{1}{10}, \frac{1}{100}$) and decimal numbers to quantify parts of an object, a collection of objects or a unit of measurement. Make comparisons between decimal numbers or between fractions and establish equivalence between both notations. Multiply and divide (by single digit numbers) natural numbers, understand the meaning

	multiplication facts for single digit numbers. Students correctly count out change from financial transactions. They continue number patterns involving addition and subtraction. Students use metric units for length, mass and capacity. They tell time to the nearest minute. Students make models of three-dimensional objects. Students conduct chance experiments and list possible outcomes. They carry out simple data investigations for categorical variables.	• Develop understanding of fractions as numbers. Measurement and Data • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. • Represent and interpret data. • Geometric measurement: understand concepts of area and relate area to multiplication and to addition. • Geometric measurement: recognise perimeter as an attribute of plane figures and distinguish between linear and area measures. Geometry • Reason with shapes and their attributes. Mathematical Practices 1-8	of these operations and their relationship with addition and subtraction. Make estimations and mental calculation of additions, subtractions, multiplications and divisions that require exact simple strategies. Solve problems in familiar contexts in which the data are not necessarily explicit or require a selection of information from the statement. Justify the strategy used and explain their reasoning. Formulate conjectures and verify through examples. Level 2: Algebra Express order relations using the appropriate symbols. Determine the unknown value in multiplication and division situations. Identify, describe and continue numeric and geometric patterns with known figures, citing a rule that generates the sequence. Explain the strategies applied in the determination of an unknown value and justify the rule chosen to generate the terms in a given pattern. Level 2: Geometry Identify properties of cylinders, cones and pyramids including faces, edges and vertices. Use 2D representations of 3D figures. Understand concepts of perimeter and area, and use grids to estimate areas that can be decomposed into rectangles. Formulate and verify conjectures concerning the possibility of building solids from different 2D representations including nets. Solve problems related to the area and perimeter of figures that can be decomposed into rectangles. Level 2: Statistics and probability Organise simple data from various situations or phenomena into simple bar graphs. Extract information about a phenomenon or situation from simple tables and bar charts. Draw conclusions and verify hypotheses by interrogating available data, or performing simple operations. Justify the procedure used.
4	By the end of Year 4, students choose appropriate strategies for calculations involving multiplication and division. They recognise common equivalent fractions in familiar contexts and make connections between fraction and decimal notations up to two decimal places. Students solve simple purchasing problems. They identify unknown quantities in number sentences. They describe number patterns resulting from multiplication. Students compare areas of regular and irregular shapes using informal units. They solve problems involving time duration. They interpret information contained in maps. Students identify dependent and independent events. They describe different methods for data collection and representation, and evaluate their effectiveness. Students use the properties of odd and even numbers. They recall multiplication facts to 10 x 10 and related division facts. Students locate familiar fractions on a number line. They continue number sequences involving multiples of single digit numbers. Students use scaled instruments to measure temperatures, lengths, shapes and objects. They convert between units of time. Students create symmetrical shapes and patterns. They classify angles in relation to a right angle. Students list the probabilities of everyday events. They construct data displays from given or collected data.	Grade 4 Overview Operations and Algebraic Thinking • Use the four operations with whole numbers to solve problems. • Gain familiarity with factors and multiples. • Generate and analyze patterns. Number and Operations in Base Ten • Generalise place value understanding for multi-digit whole numbers. • Use place value understanding and properties of operations to perform multi-digit arithmetic. Number and Operations—Fractions • Extend understanding of fraction equivalence and ordering. • Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. • Understand decimal notation for fractions, and compare decimal fractions. Measurement and Data • Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. • Represent and interpret data. • Geometric measurement: understand concepts of angle and measure angles. Geometry • Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Mathematical Practices 1-8	

5	By the end of Year 5, students solve simple problems involving the four operations using a range of strategies. They check the reasonableness of answers using estimation and rounding. Students identify and describe factors and multiples. They explain plans for simple budgets. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. Students compare and interpret different data sets. Students order decimals and unit fractions and locate them on number lines. They add and subtract fractions with the same denominator. Students continue patterns by adding and subtracting fractions and decimals. They find unknown quantities in number sentences. They use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. They convert between 12 and 24 hour time. Students use a grid reference system to locate landmarks. They measure and construct different angles. Students list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. Students pose questions to gather data, and construct data displays appropriate for the data.	Grade 5 Overview Operations and Algebraic Thinking • Write and interpret numerical expressions. • Analyze patterns and relationships. Number and Operations in Base Ten • Understand the place value system. • Perform operations with multi-digit whole numbers and with decimals to hundredths. Number and Operations—Fractions • Use equivalent fractions as a strategy to add and subtract fractions. • Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Measurement and Data • Convert like measurement units within a given measurement system. • Represent and interpret data. • Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Geometry • Graph points on the coordinate plane to solve real-world and mathematical problems. • Classify two-dimensional figures into categories based on their properties. Mathematical Practices 1-8	Level 3: Number and Operations Express natural numbers as a product of factors. Understand the meaning of base powers and the natural exponent, and apply them in diverse situations. Use positive decimal numbers to sort, compare, estimate, measure and calculate proportions. Understand the meaning of percentage and establish equivalences between these and fractions or decimal numbers to calculate percentages. Understand and perform the four operations with positive numbers both written as a decimal, fraction and in mental and written form. Solve problems and formulate conjectures in diverse contexts that require the reorganisation of the information available. Argue for the validity of a procedure, strategy or conjecture. Level 3: Algebra Understand that letters in algebraic expressions can represent different values. Recognise algebraic expressions that represent the properties of the operations and interpret algebraic expressions that represent generalisations of mathematical operation. Understand equivalent algebraic representations. Solve linear equations where the unknown is on one-side of the equality, using informal strategies. Justify strategies used to solve problems. Level 3: Geometry Know the relationship between angles formed on intersecting coplanar lines. Measure angles in degrees. Determine the area of triangles and parallelograms. Formulate conjectures concerning angles in different polygons and changes in the area of different sized parallelograms. Solve problems that involve using angles in regular polygons and calculating areas of triangles, parallelograms and related figures, justifying the approach taken. Level 3: Statistics and probability Identify those variables that provide relevant information to solve a problem and organise data in line graphs, pie charts and bar charts.
6	By the end of Year 6, students recognise the properties of prime, composite, square and triangular numbers. They describe the use of integers in everyday contexts. They solve problems involving all four operations with whole numbers. Students connect fractions, decimals and percentages as different representations of the same number. They solve problems involving the addition and subtraction of related fractions. Students make connections between the powers of 10 and the multiplication and division of decimals. They describe rules used in sequences involving whole numbers, fractions and decimals. Students	Grade 6 Overview Ratios and Proportional Relationships • Understand ratio concepts and use ratio reasoning to solve problems. The Number System • Apply and extend previous understandings of multiplication and division to divide fractions by fractions. • Compute fluently with multi-digit numbers and find common factors and multiples. • Apply and extend previous understandings of numbers to the system of rational numbers. Expressions and Equations • Apply and extend previous understandings of arithmetic to algebraic expressions. • Reason about and solve one-variable equations and inequalities.	

	connect decimal representations to the metric system and choose appropriate units of measurement to perform a calculation. They make connections between capacity and volume. They solve problems involving length and area. They interpret timetables. Students describe combinations of transformations. They solve problems using the properties of angles. Students compare observed and expected frequencies. They interpret and compare a variety of data displays including those displays for two categorical variables. They evaluate secondary data displayed in the media. Students locate fractions and integers on a number line. They calculate a simple fraction of a quantity. They add, subtract and multiply decimals and divide decimals where the result is rational. Students calculate common percentage discounts on sale items. They write correct number sentences using brackets and order of operations. Students locate an ordered pair in any one of the four quadrants on the Cartesian plane. They construct simple prisms and pyramids. Students list and communicate probabilities using simple fractions, decimals and percentages.	• Represent and analyze quantitative relationships between dependent and independent variables. Geometry • Solve real-world and mathematical problems involving area, surface area, and volume. Statistics and Probability • Develop understanding of statistical variability. • Summarise and describe distributions. Mathematical Practices 1-8	Extract information from graphs and charts. Calculate measures of central tendency (location). Understand the use of samples to study populations. Evaluate the likelihood of an event happening as possible, impossible, likely or certain, from experience and observation of simple random experiments. Conjecture about trends in the results of simple random experiments. Justify conclusions using the available information.
7	By the end of Year 7, students solve problems involving the comparison, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties of numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three-dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a	Grade 7 Overview Ratios and Proportional Relationships • Analyze proportional relationships and use them to solve real-world and mathematical problems. The Number System • Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Expressions and Equations • Use properties of operations to generate equivalent expressions. • Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Geometry • Draw, construct and describe geometrical figures and describe the relationships between them. • Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Level 4: Number and Operations Recognise the integers as a set of numbers where you can solve problems that do not support the solution in natural numbers, recognise their properties and use them to order, compare and quantify magnitudes. Establish proportions and use them to solve diverse situations of proportional variation. Understand and perform the four operations with whole numbers. Use square roots of positive integers and fractional powers of a positive base, positive decimal or integer and natural exponent in solving various problems. Solve problems and make conjectures in various contexts in which they establish relationships between concepts. Justify the strategy used, the assumptions

	transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays. Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.	Statistics and Probability • Use random sampling to draw inferences about a population. • Draw informal comparative inferences about two populations. • Investigate chance processes and develop, use, and evaluate probability models. Mathematical Practices 1-8	made and the results obtained, using concepts, procedures and mathematical relationships. Level 4: Algebra Translate from natural language expressions into mathematical language and vice versa. Simplify algebraic expressions by applying properties of operations. Solve problems in different contexts involving linear equations with the unknown on both sides of equality, using properties and conventions of algebra. Recognise the role of algebra in everyday contexts, distinguishing between independent and dependent variables. Solve problems involving proportional variation, explaining the relationship between variables. Justify the relevance of the applied procedures when modelling. Level 4: Geometry Understand the circle as a locus and identify parts of a circle. Understand Pythagoras' theorem. Understand the concept of volume. Calculate lengths of two and three dimensional figures, the area enclosed by a circle and the volume of various geometric shapes. Construct angles, triangles and regular polygons. Understand the concept of isometric transformation (translation, rotation and reflection) and transform 2-D figures. Formulate conjectures about the perimeter of polygons and volume of bodies as linear geometric elements are varied. Solve problems related to these variations. Level 4: Statistics and probability Organise data in graphs and tables, recognising the application, advantages and disadvantages of different types of representation. Extract and interpret data from frequency tables with grouped data intervals. Understand the concepts of representativeness and randomness of a sample and their effects on conclusions and inferences about a population. Understand that the Laplace model can predict the value of the
8	By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data. Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear	Grade 8 overview The Number System • Know that there are numbers that are not rational, and approximate them by rational numbers. Expressions and Equations • Work with radicals and integer exponents. • Understand the connections between proportional relationships, lines, and linear equations. • Analyze and solve linear equations and pairs of simultaneous linear equations. Functions • Define, evaluate, and compare functions. • Use functions to model relationships between quantities. Geometry • Understand congruence and similarity using physical models, transparencies, or geometry software. • Understand and apply the Pythagorean Theorem. • Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. Statistics and Probability • Investigate patterns of association in bivariate data. Mathematical Practices 1-8	

	equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities.		likelihood of a simple event, without performing experiments. Solve simple probability problems, conjecture and verify results comparing the Laplace with relative frequencies.
9	By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data in primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data. Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots.	High School — Number and Quantity Overview The Real Number System • Extend the properties of exponents to rational exponents • Use properties of rational and irrational numbers. Quantities • Reason quantitatively and use units to solve problems The Complex Number System • Perform arithmetic operations with complex numbers • Represent complex numbers and their operations on the complex plane • Use complex numbers in polynomial identities and equations Vector and Matrix Quantities • Represent and model with vector quantities. • Perform operations on vectors. • Perform operations on matrices and use matrices in applications. Mathematical Practices 1-8 High School – Algebra Overview Seeing Structure in Expressions • Interpret the structure of expressions • Write expressions in equivalent forms to solve problems Arithmetic with Polynomials and Rational Expressions • Perform arithmetic operations on polynomials • Understand the relationship between zeros and factors of polynomials • Use polynomial identities to solve problems • Rewrite rational expressions Creating Equations • Create equations that describe numbers or relationships Reasoning with Equations and Inequalities • Understand solving equations as a process of reasoning and explain the reasoning • Solve equations and inequalities in one variable	Level 5: Number and Operations Recognise rational numbers as a numeric set in which you can solve problems where integers do not support the entire solution. Recognise the irrationals as a numerical set in which you can solve problems that do not support a rational solution. Recognise the real numbers as the union of rational and irrational numbers. Interpret powers of rational bases and rational exponents, nth roots and logarithms, establish relationships between them and use them to solve various problems. Calculate with real numbers including powers, roots and logarithms in various contexts. Solve problems using strategies that involve breaking down a problem into parts or sub-problems. Justify choice of strategies or procedures. Use examples and counterexamples to verify the validity or falsity of conjectures. Level 5: Algebra Recognise linear, exponential, logarithmic and root square functions represented in tables, graphs and algebra, and use them to model situations. Manipulate algebraic expressions including algebraic fractions. Solve systems of linear equations algebraically and graphically. Solve problems involving linear functions and linear equations. Justify the relevance of an applied model and the solutions obtained. Level 5: Geometry Understand and use the concepts of congruence and similarity. Know angle properties of a circle. Transform shapes in the Cartesian plane, and use vectors to describe

		• Solve systems of equations • Represent and solve equations and inequalities graphically Mathematical Practices 1-8 High School – Functions overview Interpreting Functions • Understand the concept of a function and use function notation • Interpret functions that arise in applications in terms of the context • Analyze functions using different representations Building Functions • Build a function that models a relationship between two quantities • Build new functions from existing functions Linear, Quadratic, and Exponential Models • Construct and compare linear, quadratic, and exponential models and solve problems • Interpret expressions for functions in terms of the situation they model Trigonometric Functions • Extend the domain of trigonometric functions using the unit circle • Model periodic phenomena with trigonometric functions • Prove and apply trigonometric identities	translations. Dilate (enlarge) plane figures. Formulate and verify conjectures about transformations in the Cartesian plane. Prove circle theorems and use them to solve problems. Level 5: Statistics and probability Represent data using histograms, frequency polygons and cumulative frequency plots. Use measures of spread and location (average) to summarise data. Compare two or more sets of data using measures of spread and location. Understand that taking more samples of equal size, from a finite population, the mean of the sample means approximates the population mean. Assign probabilities using the Laplace model or relative frequencies from experiments. Solve problems about probability, using tree diagrams, including addition and multiplication of probabilities.
10	By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove	Mathematical Practices 1-8 High School – Geometry Overview Congruence • Experiment with transformations in the plane • Understand congruence in terms of rigid motions • Prove geometric theorems • Make geometric constructions Similarity, Right Triangles, and Trigonometry • Understand similarity in terms of similarity transformations • Prove theorems involving similarity • Define trigonometric ratios and solve problems involving right triangles • Apply trigonometry to general triangles Circles • Understand and apply theorems about circles • Find arc lengths and areas of sectors of circles Expressing Geometric Properties with Equations • Translate between the geometric description and the equation for a conic section • Use coordinates to prove simple geometric theorems algebraically Geometric Measurement and Dimension • Explain volume formulas and use them to	Level 6: Number and Operations Recognise complex numbers as an extension of the numeric field and use them to solve problems that do not support the solution in real numbers. Use the four operations with complex numbers. Solve problems using a wide range of strategies, combining or modifying already used strategies, formulate generalisations or assumptions that involve predictions and argue for the validity of the procedures or conjecture. Level 6: Algebra Recognise quadratic and power functions represented in tables, graphs and algebra. Distinguish injective, surjective and bijective functions. Represent and interpret various forms of solutions of inequalities and systems of inequalities. Solve quadratic equations and inequalities. Solve problems that can be modelled using power and quadratic functions. Level 6: Geometry Link equations to their graphs. Distinguish points, lines and planes in space. Describe the effect of translation and rotation on plane

	congruence and similarity. Students use trigonometry to calculate unknown angles in right-angled triangles. Students list outcomes for multi-step chance experiments and assign probabilities for these experiments. They calculate quartiles and inter-quartile ranges.	solve problems • Visualise relationships between two-dimensional and three-dimensional objects Modeling with Geometry • Apply geometric concepts in modeling situations Mathematical Practices 1-8 High School – Statistics and Probability Overview Interpreting Categorical and Quantitative Data • Summarise, represent, and interpret data on a single count or measurement variable • Summarise, represent, and interpret data on two categorical and quantitative variables • Interpret linear models Making Inferences and Justifying Conclusions • Understand and evaluate random processes underlying statistical experiments • Make inferences and justify conclusions from sample surveys, experiments and observational studies Conditional Probability and the Rules of Probability • Understand independence and conditional probability and use them to interpret data • Use the rules of probability to compute probabilities of compound events in a uniform probability model Using Probability to Make Decisions • Calculate expected values and use them to solve problems • Use probability to evaluate outcomes of decisions Mathematical Practices 1-8	figures. Determine the magnitude of a vector in two or three dimensions. Determine the surface area and volume of bodies generated by translations and rotations. Describe the dilation (enlargement) of plane figures using a centre of enlargement and a scale factor. Formulate conjectures about the shape of bodies generated from rotations and translations of plane figures in space. Solve problems involving systems of linear equations using analytical and graphical methods. Level 6: Statistics and probability Apply normal and binomial distributions. Critically analyse statistics, considering the representativeness of the sample, its size and confidence level. Estimate population parameters using confidence intervals. Understand that for any population the distribution of sample means is normal with a mean equal to that of the population. The larger the sample size the better the estimate of the population mean. Use technology to explore the proximity of the theoretical distribution for a random variable and the corresponding frequency graph obtained via random experiment. Make inferences from a random sample, considering the magnitude of the associated error. Solve problems by calculating conditional probabilities. Level 7: Number and Operations Understand the different number sets, the relationships between them and the problems from which they originated. Understand that each set of numbers can be operated on using rules and properties that can be used to justify or show relationships. Show autonomy and flexibility when solving a wide range of problems, both routine and not routine, using various strategies and appropriate assumptions. Use mathematical language to present arguments in mathematical situations. Level 7: Algebra

			Interpret and use the conventions of algebra to represent generalisations and relationships between numbers, variables, functions or other mathematical objects establishing new algebraic representations at a higher level of abstraction. Show autonomy and flexibility in the manipulation of symbolic expressions, recognising and choosing different equivalent forms of algebraic representations. Model situations or phenomena from diverse sources. Use mathematical arguments and properties to demonstrate propositions. Level 7: Geometry Solve geometric problems establishing relationships between concepts, techniques and procedures from different areas of mathematics. Select several methods to solve problems in different geometric contexts, according to the characteristics of the problem. Conjecture about geometric explorations with technological tools and verify geometrical propositions through direct and indirect proofs and demonstrations. Level 7: Statistics and probability Use probabilistic modelling to solve problems in contexts of uncertainty. Use technology for data analysis, representation and statistics. Make inferences. Evaluate statistical information considering the procedures used and representativeness of the sample. Make inferences about a population from the statistical analysis of a sample. Apply probability and problem solving in a wide range of situations.

6b.ii **Mathematics Scope and Sequence**

Australia - Foundation to Grade 10

The Mathematics scope and sequence is presented in three strands.

- Number and Algebra
- Measurement and Geometry and
- Statistics and Probability

The table below shows the sub-strands under each of these strand headings, along with detail of their coverage.
The sub-strands of the Australian curriculum have been used to structure this document and provide a direct comparison with the other countries.

USA – Kindergarten to Grade 8

The US common core covers from K (Kindergarten) to Grade 8. After that there are high school units: number and quantity (NQ), algebra (A), functions (F), geometry (G) and statistics and probability (SP). The analysis includes only those elements that occur within the Australian curriculum.

Chile – Grades 1 to 8

The curriculum extends for 8 years. Grades 7 and 8 are set out as units of work as opposed to the strands: numbers & operations; patterns & algebra; geometry; measurement; data & probability. Note that trigonometry, similarity, enlargement and scaling are not included in this basic curriculum.

Each element of the curriculum in the table below follows a number or letter indicating the stage, year or grade at which it is taught.

Strand: Number and Algebra	Australia[i]	USA (Common Core)[ii]	Chile[iii]
Number and place value	**F** count to and from 20; connect number names, numerals and quantities, including zero up to 10 **1** count to and from 100; skip count in twos, fives and tens; locate numbers on a number line; partition numbers using place value; simple addition and subtraction by counting and partitioning **2** count to and from 1000; extend skip counting to threes; recognise increasing and decreasing	**K** count to and from 100 in ones and tens; recognise numerals to 20; cardinality; understand addition and subtraction as actions on sets **1** represent and solve problems involving addition and subtraction within 20; understand addition and subtraction as inverse operations; use place value to add and subtract two digit numbers **2** count to and from 1000; skip count in fives, tens, hundreds; know number bonds to 20; addition and subtraction to 100, work with equal groups of	**1** count to and from 100; skip count in twos, fives and tens; recognize numerals to 20; cardinality; ordinality; represent and solve problems involving addition and subtraction within 20; understand addition and subtraction as inverse operations **2** extend counting to 1000; extend numerals to 100; partition numbers using place value – concrete, pictorial, symbolic; mental methods for addition and subtraction including doubling and halving;

Strand: Number and Algebra	Australia[i]	USA (Common Core)[ii]	Chile[iii]
	sequences; represent multiplication and division by grouping into sets; use a range of strategies for simple addition and subtraction **3** count to and from 10 000; odds and evens; understand addition and subtraction as inverse operations; represent multiplication as repeated addition, groups and arrays; recognise division as grouping; efficient mental and written methods for addition and subtraction; recall number bonds to ten; recall multiplication facts for two, three, five and ten **4** recall multiplication facts up to 10×10 and related division facts; apply place value to partition, rearrange and regroup numbers up to tens of thousands; use efficient mental written and calculator methods for multiplication, and division where there is no remainder **5** identify and describe factors and multiples; use estimation and rounding to check reasonableness of answers; solve simple problems using addition, subtraction, multiplication and division selecting from mental, written and calculator methods; extend division to include remainders **6** recognise prime, composite, square and triangle numbers; use integers in everyday contexts; use brackets and order of operations **7** represent whole numbers as products of prime numbers; connect whole numbers and index notation; relate perfect squares with square roots; compare, order, add and subtract integers; apply the associative, commutative and distributive laws to aid mental and written calculation **8** use index laws with whole numbers; efficient mental and written strategies for calculating	objects up to 5×5; odds and evens **3** represent multiplication and division up to 100; understand multiplication and division as inverse operations; use commutative, associative and distributive properties to assist with mental calculations; use place value to calculate with three-digit numbers; use estimation and rounding **4** extend number understanding to 1 000 000; use place value to calculate with multi-digit numbers (e.g. four digit number multiplied by a two digit number, four digit number divided by a single digit number); factors and multiples **5** 'standard algorithms' for addition, subtraction, multiplication and division of whole numbers; multiplication as scaling; whole number exponents for powers of ten **6** common factors and multiples; extend number understanding to integers	multiplication as repeated addition; multiples of two, five and ten; use commutativity **3** extend skip counting to include threes and fours; mental methods for addition and subtraction to 100; add up to four numbers; use associativity **4** extend counting to 10 000; use mental methods to generate multiplication facts up to 10×10 and related division facts; use distributivity to assist with calculation; estimation **5** extend numbers up to 1 000 000 000 and identify place value; mental methods for multiplication; estimation; hierarchy of operations and brackets; use commutative, associative and distributive properties **6** factors and multiples; prime and composite numbers **7** add and subtract integers; order integers on a number line; powers and exponents; integer powers of ten; square root **8** multiply and divide integers; index laws for multiplication and division

Strand: Number and Algebra	Australia[i]	USA (Common Core)[ii]	Chile[iii]
	with integers		
Fractions and decimals	**1** identify representations of one half **2** divide collections and shapes into halves, quarters, eighths **3** model and represent unit fractions ($\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$) **4** recognise common equivalent fractions in context; connect fraction and decimal notation up to two decimal places (d.p.) **5** order decimals and locate them on a number line; order unit fractions and locate them on a number line; add and subtract fractions with the same denominator **6** connect fractions, decimals and percentages as the same number; add and subtract related fractions; connect powers of ten and the multiplication and division of decimals; find a fraction of a quantity; add, subtract, multiply and divide decimals	**1** divide rectangles and circles into halves and quarters **2** extend to thirds **3** unit fractions as numbers on a number line; fractions of quantities **4** equivalent fractions; build fractions from unit fractions; add and subtract fractions with the same denominator; connect fraction and decimal notation up to two decimal places (d.p.) **5** use equivalent fractions to add and subtract fractions with different denominators; calculate with decimals up to 3 d.p.; multiply and divide(unit fractions with whole number only) fractions **6** divide fractions **7** percentages	**3** recognise and represent fractions in common use: $\frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ **4** understand fractions with denominators 100, 12, 10, 8, 6, 5, 4, 3, 2, locate on a number line; add and subtract fractions with the same denominator; represent decimals to two decimal places (d.p.); add and subtract decimals to 2d.p. **5** equivalent fractions; improper fractions and mixed numbers on a number line; equivalent fractions (with denominator 2, 4, 5 and 10) and decimals; add and subtract decimals to 3d.p. **6** percentages; addition and subtraction of proper and improper fractions and mixed numbers **7** powers of fractions and decimals
Real Numbers	7 use equivalence to compare and calculate with fractions, percentages and decimals; solve problems involving percentages, fractions and decimals; express one quantity as a fraction of another 8 distinguish terminating and recurring decimals; solve problems involving rates, ratios and percentages; describe rational and irrational numbers **9** solve problems involving direct proportion; express numbers in scientific notation; apply index laws to integer indices **10** A calculate with surds and fractional indices	**6** solve problems involving rates and ratios; extend understanding of number to rational numbers **7** calculate with percentages, including percentage change; distinguish terminating and recurring decimals **8** irrational numbers; radicals and exponents (indices); scientific notation NQ rational exponents (indices); properties of rational and irrational numbers	**7** ratio and proportion; rational numbers **8** solve problems involving direct and indirect proportionality
Money and financial mathematics	**1** recognise Australian coins by value **2** associate collections of Australian coins with their value **3** represent money values in various ways; count the change required in simple transactions	**2** associate American notes and coins with their value **4** solve problems involving addition and subtraction of money **7** use percentages to calculate discount, interest, taxes, tips	**4** solve problems that require calculations with money

Strand: Number and Algebra	Australia[i]	USA (Common Core)[ii]	Chile[iii]
	4 solve simple purchasing problems **5** create and explain simple financial plans **6** calculate common percentage discounts (10%, 25%, 50%) on sale items **7** compare the cost of items to make financial decision **8** solve problems involving profit and loss **9** solve problems involving simple interest **10** use digital technologies to calculate compound interest and recognise it is repeated simple interest		
Patterns and algebra	**1** skip counting by two, five and ten, continue simple patterns **2** identify a missing element in a number sequence **3** continue number patterns involving addition or subtraction **4** number sequences involving multiples of single digit numbers; find unknown quantities in addition and subtraction calculations **5** find unknown quantities in calculations; extend number sequences to include fractions and decimals **6** describe the rule to generate a sequence; brackets and hierarchy of operations **7** represent numbers using variables; substitute values in expressions; extend the laws and properties of arithmetic to algebraic terms and expressions **8** simplify, expand and factorise algebraic expressions **9** expand binomial expressions	**K** counting in tens to 100 **1** understand the equals sign e.g. 3+4=9-2 **2** skip counting in five, tens, hundreds; find unknown quantities in addition and subtraction calculations **3** solve two step word problems which can be written as an equation representing the unknown by a letter **4** generate and analyse number patterns **5** use brackets in calculations; use rules to generate number patterns **6** substitute values in expressions; extend the laws and properties of arithmetic to algebraic terms and expressions; recognize equivalent expressions **7** generate equivalent expressions; solve real-life and mathematical problems using numerical and algebraic expressions and equations **A** create equations that describe numbers or relationships; use polynomial identities to solve problems; write expressions in equivalent forms (factorise, expand, simplify)	**1** describe, create and continue repeating patterns including those with numbers (e.g. backwards from 20); record equality and inequality using practical equipment, pictures and symbols **2** identify a missing element in a number sequence **3** build, describe and record number patterns on a 1-100 square; find unknown quantities in simple calculations **4** identify and describe number patterns; solve simple equations and inequalities **5** find a rule for generating a sequence successively; solve problems using one-step equations and inequalities **6** describe the rule to generate a sequence **7** simplify expressions; recognize and generate equivalent expressions
Linear and non-linear relationships	**7** plot coordinates on the Cartesian plane; solve simple linear equations; interpret simple linear representations of authentic data **8** solve linear equations and graph linear relationships on the	**6** solve simple linear equations and inequalities; represent and analyse quantitative relationships between dependent and independent variables **7** analyse proportional relationships and use to solve problems; distinguish proportional relationships; determine	**6** solve simple linear equations using a balance **7** solve linear equations whose solutions may be integers or rational numbers **8** represent relationships between variables algebraically; functions;

Strand: Number and Algebra	Australia[i]	USA (Common Core)[ii]	Chile[iii]
	Cartesian plane **9** find the distance between two points on the Cartesian plane; sketch graphs of linear and non-linear relations **10** solve linear inequalities and sketch the solution on a number line; solve linear simultaneous equations; solve problems involving parallel and perpendicular lines; solve linear equations involving simple algebraic fractions **10**A describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions; solve quadratic equations; transform functions	the slope of a graph of a linear relationship **8** understand connections between proportional relationships, lines and linear equations; analyse and solve linear equations and pairs of simultaneous linear equations; use functions to model relationships between quantities; find the distance between two points on the Cartesian plane A understand the relationship between factors and zeros; solve equations and inequalities in one variable; represent and solve equations and inequalities graphically F construct and compare linear, quadratic and exponential models	distinguish proportional and non-proportional relationships; use software to explore proportional relationships

Strand: Measurement and Geometry	Australia	USA (Common Core)	Chile
Using units of measurement	**F** compare objects using mass, length and capacity; connect events with days of the week; order events and compare durations **1** order objects based on length or capacity using informal measures; tell the time to the half hour **2** extend informal measures to area and volume; tell time to quarter hour and use a calendar to identify date and month **3** use metric measures for length, mass, capacity; tell time to the minute **4** use scaled instruments to measure temperature, length, mass and capacity; convert between units of time **5** use appropriate units of measurement for length, area, volume, capacity and mass; calculate perimeter and area of rectangles; convert between 12 hour and 24 hour clock **6** connect decimal representation to metric measures and select appropriate units for calculations; connect volume and capacity;	**K** compare objects using length and weight **1** measure by iterating a (non-standard) unit of length; tell the time to the half hour **2** tell the time to five minutes on analogue and digital clocks; measure lengths using cm and m, feet and inches **3** tell the time to the nearest minute; calculate time intervals; measure 'liquid volume' (capacity) in litres and mass in kg and g; link area of rectangles with multiplication and repeated addition; perimeter of plane figures; distinguish between linear and area measure **4** solve problems involving addition and subtraction of distance, time, mass, capacity; use metric and imperial measures for distance, mass and capacity; convert from a larger to a smaller units e.g. days→hours, hours→minutes, m→cm, feet→inches; use formulae for area and perimeter of rectangles **5** convert like measurement units within a given measurement system; find the volume of cuboids; use the formula to find the volume of a prism;	**1** use non-standard measures of length; sequence events using day, week, month of the year and significant dates; compare and order objects by length **2** identify days, weeks, months, dates on a calendar; tell the time to the half hour; use m and cm to measure length **3** read and interpret timelines and calendars; read time to the nearest minute on analogue and digital clocks; find the perimeter of rectangles (and squares); measure mass using g and kg **4** read and record measures of time; use am, pm and 24 hour clocks; convert between units of time; convert between cm and m; area of a rectangle; volume of a cuboid **5** convert between metric units for length; construct rectangles given either perimeter or area or both; area of triangles, parallelograms and trapeziums compared to the area of a rectangle **6** surface area of cubes and parallelepipeds related to their nets **7** volume of prisms and pyramids **8** circumference and area enclosed

Strand: Measurement and Geometry	Australia	USA (Common Core)	Chile
	solve problems involving length and area; interpret timetables **7** use formulae for finding the area and perimeter of rectangles and the volume of a cuboid **8** circumference and area enclosed by a circle; volume of prisms; perimeter and area of parallelogram, rhombus, kite **9** area of composite shapes; surface area and volume of prisms and cylinder **10** surface area and volume problems for composite solids (prisms and cylinders) **10**A extend 10 to spheres and cones	understand the relationship between volume and capacity **6** solve problems involving area, surface area and volume; derive the area of triangles and special quadrilaterals (e.g. parallelogram) by relating it to a rectangle; relate the surface area of prisms and pyramids to their nets **7** circumference and area enclosed by a circle **8** volume of cylinder, cone, sphere NQ use units to solve problems G find arc lengths and areas of sectors of circles; explain volume formulae and use them to solve problems	by a circle; arc length; sector area; surface area of cylinders, cones and pyramids; volume of cylinders and cones using formulae
Shape	**F** group objects based on common characteristics; sort shapes and objects **1** recognise and characterise 2D shapes and 3D objects **2** describe and draw 2D shapes, recognise features of 3D objects **3** make models of 3D objects **4** connect 3D objects to their nets **5** connect 3D objects to various 2D representations **6** construct simple prisms and pyramids	**K** distinguish 2D shapes and 3D objects; sort shapes and objects; analyse, compare, create and compose shapes **1** distinguish defining attributes (e.g. properties) and non-defining attributes (e.g. colour, size, orientation) **2** draw 2D shapes with given attributes **3** find fractions of shapes **4** recognise right angles, perpendicular and parallel lines in shapes; identify reflective symmetry **5** classify shapes using hierarchy of properties **6** plot shapes on the Cartesian plane; nets of 3D shapes G make geometric constructions; relationships between 2D and 3D objects	**1** recognise and characterise 2D shapes and 3D objects; draw straight lines and curves **2** compare and construct 2D shapes; compare and construct 3D objects **3** build a 3D object from a net; faces, edge and vertices of cubes, parallelepipeds; spheres, cones, cylinders, pyramids **4** connect 3D objects to various 2D representations; identify reflective symmetry **5** parallel and perpendicular edges and faces on 3D solids; parallel and perpendicular edges on 2D shapes **6** construct triangles **7** construct perpendicular and parallel lines, and angle bisector using geometric tools and technology; construct triangles given properties and construct different centres
Geometric reasoning	**3** identify angles as a measure of turn; compare angles in everyday situations **4** classify angles in relation to a right angle **5** use a protractor to measure and construct angles to the nearest degree **6** solve problems using the properties of angles **7** identify corresponding, alternate and co-interior	**4** understand angle as a measure of turn; use a protractor to measure angles to the nearest degree **7** identify corresponding, alternate and co-interior (supplementary), vertically opposite angles; solve problems involving angles **8** congruence and similarity G prove geometric theorems including the use of congruence and similarity; use coordinates to prove simple geometric theorems algebraically	**3** understand angle as a measure of turn; classify angles in relation to a right angle and 45^{o} **4** compare angles **5** congruence **6** construct acute, obtuse and reflex angles; angle sum of a triangle and quadrilateral; identify corresponding, alternate and co-interior (supplementary), vertically opposite angles; solve problems involving angles; use a protractor to measure

Strand: Measurement and Geometry	Australia	USA (Common Core)	Chile
	(supplementary) angles; classify triangles by side and angle properties; classify quadrilaterals; angle sum of polygons **8** congruence; properties of quadrilaterals **9** use enlargement to explore similarity **10** formulate proofs using congruent triangles, similarity and angle properties **10**A angle and chord properties of circles		and construct angles to the nearest degree **7** formulate and test conjectures related to perimeter, area and volume
Location and transformation	**F** use appropriate language to describe location **1** give and follow directions **2** interpret simple maps of familiar locations, explain the effects of one-step transformations (slide, flip, half and quarter turns) **3** identify locations on a simple map; identify symmetry in the environment **4** interpret information contained in maps; create symmetric shapes and patterns **5** use a grid reference system to specify location; transform 2D shapes (translation, reflection, rotation); identify line and rotational symmetry **6** describe combinations of transformations; locate a point using coordinates in any of the four quadrants of the Cartesian plane	**K** use appropriate language to describe relative position and location **5** plot coordinates in the first quadrant of the Cartesian plane **6** plot coordinates in all four quadrants of the Cartesian plane **7** scale drawing **8** transformations: translate, rotate, reflect and dilate (enlarge)	**1** use appropriate language to describe relative position and location **3** locate an object on a simple map or grid; recognise shapes in the environment that have been translated, reflected or rotated **4** reflect with a mirror and rotate objects; describe absolute and relative location **5** plot coordinates in the first quadrant of the Cartesian plane; use translation, rotation and reflection **6** use transformations to tile the plane (tessellate) **8** characterise, recognise and construct isometric transformations (translation, rotation, reflection); construct regular and semi-regular tessellations using transformations, geometric tools (straight edge and a pair of compasses) and technology
Pythagoras and trigonometry	**9** Pythagoras' theorem; use trigonometry to find unknown sides in right angled triangles; link trigonometry to similarity **10** use trigonometry to find unknown angles in right angled triangles **10**A sine and cosine rules; unit circle and trigonometric functions; simple trigonometric equations; application of Pythagoras and trigonometry in 3D	**8** Pythagoras' theorem G define and use trigonometric ratios to solve right angled triangles; sine and cosine rules F model periodic phenomena with trigonometric functions; extend the domain of trigonometric functions using the unit circle	**7** Pythagoras' theorem

Strand: Statistics and Probability	Australia	USA (Common Core)	Chile
Chance	**1** classify outcomes of familiar events e.g. will/won't happen **2** describe outcomes for everyday events (more/less likely) **3** conduct chance experiments and list possible outcomes **4** list probabilities of everyday events; identify dependent and independent events **5** list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1 **6** compare observed and expected frequencies; represent probabilities as fractions, decimals or percentages **7** determine the sample space for simple experiments with equally likely outcomes and assign probabilities **8** use two-way tables and Venn diagrams to model authentic situations; determine complementary events and calculate the sum of probabilities **9** use relative frequencies to estimate probabilities; list outcomes for two-step experiments and assign probabilities 10 list outcomes for multi-step experiments and assign probabilities; statistical independence	**7** investigate chance processes and develop, use and evaluate probability models; use the 0-1 scale for probabilities; conduct experiments and simulations; use lists, tables, sample spaces and tree diagrams to record outcomes for compound events SP understand independence and conditional probability; compute probabilities of compound events; use probability to make decisions by using expected values and/or probabilities	**2** collect and record date about games of chance **3** order data from random games with dice and coins identify extreme values and the middle value (median) **4** conduct randomised experiments **5** describe the possibility of an event using language of likelihood and compare them **6** investigate repeated experiments **7** use relative frequencies to estimate probabilities **8** compare theoretical probabilities for chance events with experimental outcomes
Data representation and interpretation	**F** answer simple questions to collect data **1** collect data by asking questions and draw simple data displays **2** collect data to answer questions and create lists, tables and picture graphs **3** carry out simple data investigations using categorical data **4** describe different methods for data collection and presentation and evaluate effectiveness; construct data displays with given or collected data **5** compare and interpret data sets; pose questions to gather data and select an appropriate form of display	**K** classify objects and count the number in each category **1** represent and interpret categorical data **2** create bar charts and picture graphs **3** use data to answer how many more/less questions **4** interpret line plots Represent and interpret data which includes fractions **6** calculate the mean and median as a measure of central tendency; use the interquartile range and mean absolute deviation as a measure of variability; draw histograms and box plots **7** use random sampling to draw inferences about a population; draw informal comparative inferences about two populations	**1** collect data to answer questions and create tallys, block graphs and picture graphs **2** build, read and interpret pictograms and simple bar charts **3** conduct surveys organise the data in tables and visualise in bar graphs; represent data using dot plots **4** compare results of surveys with the results of random samples **5** calculate the average and interpret it; interpret tables, charts and line graphs; stem and leaf plots **6** compare distributions for two sets of data; interpret graphs and pie charts and draw conclusions **7** analyse data using various tables and graphs – select the most suitable form; sampling

Strand: Statistics and Probability	Australia	USA (Common Core)	Chile
	6 interpret and compare different data displays including those for two categorical variables; evaluate secondary data presented in the media **7** calculate mean, median, mode and range; describe the relationship between mean and median; construct stem and leaf plots and dot-plots **8** sampling; effect of outliers on the mean and median **9** compare techniques for collecting primary and secondary data; make sense of the position of the median and mean in skewed, symmetric and bi-modal displays to describe and interpret data; construct histograms and back-to-back-stem and leaf plots **10** compare data sets by referring to the shape of the various data displays; describe bivariate data where the independent variable is time; describe statistical relationship between tow continuous variables; evaluate statistical reports; calculate quartiles and inter-quartile range	**8** investigate patterns of association (correlation) in bivariate data; draw scatterplots SP summarise, represent and interpret data for single variable and bivariate data; interpret linear models; understand and evaluate random processes underlying statistical experiments; make inferences and justify conclusions from sample surveys and observational studies	**8** interpret frequency tables for grouped data; represent grouped data; measures of central tendency for grouped data; random sampling and inference

6c.i Science National Standards

The Common Core of the USA does not include Science so there are no standards to include here.

There are considerable differences between Australia and Chile in the way they set out their standards for Science. As the table shows, Australia presents year by year content and process standards whereas Chile uses bands that approximate to two grades and provides level descriptors followed by examples of expected performance.

	Australia	Chile
Overview	Achievement standards are set out year on year, in two parts with A) content standards followed by B) process standards. These two parts are presented separately below. A set of annotated student work sample portfolios is also provided (not included here) to show what satisfactory, below satisfactory and above satisfactory performance looks like when judged against the standards. By the end of the year, students should be able to…	Expectation in Chile was set out in 'progress maps', although these have now been withdrawn. The example below from the progress map for Biology is included here to illustrate an approach to expressing standards in terms of progress over time. This map shows the standard expected at the end of each of seven levels, with each level corresponding to approximately two years of schooling. 'For example, level 1 corresponds approximately to the achievement expected for most children at the end of the 2nd grade, level 2 corresponds to the end of 4th grade and so on. The last level (7) describes the learning of a pupil who upon graduation is 'outstanding'.' So the alignment with grades becomes looser as learners progress through the system so that the standards do not hold back more able students. For each level there is Y) a level description followed by Z) examples of the sort of performance that would be expected of pupils at that level. These two elements are presented separately below. There are separate maps for each science subject. For the sake of keeping the table of a manageable size, Biology is the only subject included here. By the end of the level the learner…
F	A) ...describe the properties and behaviour of familiar objects; suggest how the environment affects them and other living things. B) …share observations of familiar objects and events.	Foundation level is not included in Chile.
1	A)…describe objects and events they encounter in their everyday lives and the effects of interacting with materials and objects; identify a range of habitats; describe changes to things in their local environment and suggest how science helps people	Y)…describes the essential differences between living and non-living matter; identifies functional similarities between the external structures of different animals and plants that meet their basic needs; makes observations in their environment and describes them

	care for environments. B)…make predictions and investigate everyday phenomena; follow instructions to record and sort their observations and share their observations with others.	in oral and written form; compares and classifies according to basic categories; identifies causes and makes realistic assumptions; asks questions about features and consequences of observations and knowledge; recognizes that two descriptions the same object can be different Z) …gives examples of living beings and inert matter in the environment; notes differences (eg: growth, reproduction, nutrition and ability to react to stimuli) between non-living things and living organisms (including humans); identifies similarities and differences between forms of respiration, nutrition and reproduction in various animal and plants; groups organisms according to their physical characteristics, ways of moving, feeding and gas exchange; makes realistic assumptions about the function of certain adaptations or external structures of animals (eg: a tail or a cat's whiskers); identifies external structures that perform the same function in different animals (eg fins and legs); points out the features of the observed elements (eg the outer structures of a plant).
2	A)…describe changes to objects, materials and living things; identify that certain materials and resources have different uses and describe examples of where science is used in people's daily lives. B)…pose questions about their experiences and predict outcomes of investigations; use informal measurements to make and compare observations; follow instructions to record and represent their observations and communicate their ideas to others.	
3	A)…use their understanding of the movement of the Earth, materials and the behaviour of heat to suggest explanations for everyday observations describe features common to living things; describe how they can use science investigations to respond to questions and identify where people use science knowledge in their lives; use their experiences to pose questions and predict the outcomes of investigations. B)…make formal measurements and follow procedures to collect and present observations in a way that helps to answer the investigation questions; suggest possible reasons for their findings; describe how safety and fairness were considered in their investigations; use diagrams and other representations to communicate their ideas.	Y)… recognizes that to meet basic needs, living beings use various external structures in a co-ordinated way; recognizes that animals and plants can be grouped according to anatomical features for classification (mammals, birds, fish, plants, flowers, etc.); obtains evidence through simple guided investigations; performs measurements using standard units; records and classifies information using two or more criteria and represents data in tables and simple graphics; formulates predictions, conclusions and possible explanations to problems raised and justifies information; distinguishes between opinion and evidence . Z)… identifies the main external structures of an animal involved in life processes and their corresponding functions (eg: structures for finding and catching food); classifies animals or plants in a table using two classification criteria (eg: relating type of skin to group of animal); lists characteristics observed in living things; suggests consequences of modifying plant structures involved in life processes (eg: What if a rabbit eats the buds off a plant?); describes the changes expected in a simple experiment .
4	A)...apply the observable properties of materials to explain how objects and materials can be used; use contact and non-contact forces to describe interactions between objects; discuss how natural and human processes cause changes to the Earth's surface; describe relationships that assist the survival of living things and sequence key stages in the life cycle of a plant or animal; identify when science is used to ask questions and make predictions; describe situations where science understanding can influence their own and others' actions. B)…follow instructions to identify investigable questions about familiar contexts and predict likely outcomes from investigations; discuss ways to conduct investigations and safely use equipment to make and record observations; use provided tables	

	and simple column graphs to organise their data and identify patterns in data; suggest explanations for observations and compare their findings with their predictions; suggest reasons why their methods were fair or not; complete simple reports to communicate their methods and findings.	
5	A)...classify substances according to their observable properties and behaviours; explain everyday phenomena associated with the transfer of light; describe the key features of our solar system; analyse how the form of living things enables them to function in their environments; discuss how scientific developments have affected people's lives and how science knowledge develops from many people's contributions. B)...follow instructions to pose questions for investigation, predict what might happen when variables are changed, plan investigation methods, use equipment in ways that are safe and improve the accuracy of their observations; construct tables and graphs to organise data and identify patterns; use patterns in their data to suggest explanations and refer to data when they report findings; describe ways to improve the fairness of their methods and communicate their ideas, methods and findings using a range of text types.	Y)… understands the overall function of the respiratory, digestive, circulatory, excretory, musculoskeletal, reproductive and nervous systems and recognizes their main structures and their functions; recognizes functional relationships between some of these systems; recognizes that the malfunction of an organ and / or system leads to disruption of health; formulates testable questions and plans and conducts a simple experiments; develops models to represent concepts; organizes and represents data sets in charts and graphs and identifies patterns and trends; formulates and justifies predictions, conclusions, explanations using the concepts studied: recognizes that scientific explanations come partly from observations and their interpretation. Z)… relates the function of the respiratory and circulatory systems in the uptake and transport of oxygen; recognizes the joint function of the digestive and circulatory systems in the absorption and transport of nutrients; describes the joint function of the skeletal and muscular systems in mobility and in protecting internal organs, makes a diagram of the digestive system, identifying major structures and functions; predicts the consequences for the functioning of the organism if certain organs fail or are removed eg: kidneys; points out differences and similarities in how plants reproduce with and without flowers.
6	A)…compare and classify different types of observable changes to materials; analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another to generate electricity; explain how natural events cause rapid change to the Earth's surface; describe and predict the effect of environmental changes on individual living things; explain how scientific knowledge is used in decision making and identify contributions to the development of science by people from a range of cultures. B)...follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships; identify variables to be changed and measured and describe potential safety risks when planning methods; collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data; describe and analyse relationships in data using graphic representations and construct multi-modal texts to communicate ideas, methods and findings.	
7	A)…describe techniques to separate pure substances from mixtures; represent and predict the effects of unbalanced forces, including Earth's gravity, on motion; explain how the relative positions of the Earth, sun and moon affect phenomena on Earth; analyse how the sustainable use of resources	Y)… understands the overall structure and function of the cell and its place in the level of organization of living things; recognizes that the circulatory, respiratory and gastrointestinal systems provide oxygen and nutrients to the body's cells and that the excretory system removes waste from the cell; formulates a hypothesis to

	depends on the way they are formed and cycle through Earth systems; predict the effect of environmental changes on feeding relationships and classify and organise diverse organisms based on observable differences; describe situations where scientific knowledge from different science disciplines has been used to solve a real-world problem; explain how the solution was viewed by, and impacted on, different groups in society. B)...identify questions that can be investigated scientifically; plan fair experimental methods, identifying variables to be changed and measured; select equipment that improves fairness and accuracy and describe how they considered safety; draw on evidence to support their conclusions; summarise data from different sources, describe trends and refer to the quality of their data when suggesting improvements to their methods; communicate their ideas, methods and findings using scientific language and appropriate representations.	explain a problem and performs simple investigations to verify it, controlling variables involved; represents concepts studied through models and diagrams; develops criteria for organizing data in tables and graphs; understands the difference between hypothesis and prediction and between results and conclusions in real situations; understands that scientific knowledge is provisional and subject to change in the light of new evidence. Z)… arranges in sequence the different levels of organization of living things from cell to organism; describes the functions of the main parts of a plant or animal cell (eg: nucleus, cytoplasm, membrane); explains the impact of microscopy and the discovery of cells; explains the requirements of cells at different stages of physical activity; suggests possible explanations for, for example, fluctuations in levels of gases and nutrients in the blood.
8	A)…compare physical and chemical changes and use the particle model to explain and predict the properties and behaviours of substances; identify different forms of energy and describe how energy transfers and transformations cause change in simple systems; compare processes of rock formation, including the time scales involved; analyse the relationship between structure and function at cell, organ and body system levels; examine the different science knowledge used in occupations; explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems. B)…identify and construct questions and problems that they can investigate scientifically; consider safety and ethics when planning investigations, including designing field or experimental methods; identify variables to be changed, measured and controlled; construct representations of their data to reveal and analyse patterns and trends, and use these when justifying their conclusions; explain how modifications to methods could improve the quality of their data and apply their own scientific knowledge and investigation findings to evaluate claims made by others; use appropriate language and representations to communicate science ideas, methods and findings in a range of text types.	
9	A)...explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions; describe models of energy transfer and apply these to explain phenomena; explain global features and events in terms of geological processes	Y)…understands that different organs and tissues result from the organization of different types cell; recognizes that the biological molecules that make up the cellular structures are associated with metabolic processes involved in the production and use of energy in the cell; recognizes how some organ systems work together

	and timescales; analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter; describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives. B)...design questions that can be investigated using a range of inquiry skills; design methods that include the control and accurate measurement of variables and systematic collection of data and describe how they considered ethics and safety; analyse trends in data, identify relationships between variables and reveal inconsistencies in results; analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence; evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.	through molecular transport mechanisms; understands the processes of mitosis and meiosis and the relationship of the latter with individual genetic variability; describes problems, hypotheses, experimental procedures and findings in scientific research, relating them to their socio-historical context; interprets and explains the trends in a set of empirical data or other sources in terms of concepts and the assumptions they support or refute; recognizes the limitations and usefulness of models and theories as scientific representations of reality. Z)…describes the structural and energy functions of the major molecular components of the cell; describes the function of the cellular organelles involved in energy utilization and reproduction; explains the stages of meiosis and their role in genetic variability; explains the role of specialized cell structures in eg: absorption, secretion and contraction muscular in different tissues; outlines the functional relationship between neurons and between neurons and muscle cells (neurotransmitters) in, for example, in muscle control; describes the action of some illicit drugs on the nervous system; describes how a classic experimental procedure has shown, for example, that the crossing-over results in genetic variability.
10	A)…analyse how the periodic table organises elements and use it to make predictions about the properties of elements; explain how chemical reactions are used to produce particular products and how different factors influence the rate of reactions; explain the concept of energy conservation and represent energy transfer and transformation within systems; apply relationships between force, mass and acceleration to predict changes in the motion of objects; describe and analyse interactions and cycles within and between Earth's spheres; evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth; explain the processes that underpin heredity and evolution; analyse how the models and theories they use have developed over time and discuss the factors that prompted their review. B)...develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation; explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data; when analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty; evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited; construct evidence-based arguments and select appropriate representations and text types to	

	communicate science ideas for specific purposes.	
High performance		Y)…It includes participation in the processes of replication, transcription and protein synthesis in the transmission of genetic information . Understands that the same information gene is expressed differently in different cells. It includes the contribution of the nervous and endocrine systems in maintaining the internal environment in terms molecular communication . It includes the general principles of operation immune system in defending organisms. Critically evaluates between hypotheses , concepts , procedures, data results and findings of scientific research classic and contemporary . Assesses the social, economic , ethical implications and environmental public controversies involving science and technology. He recognizes that when the information does not match any accepted scientific theory information It is erroneous or fraudulent , or the theory is wrong Z)… Explains in general terms why the experimental procedure that allowed us to demonstrate that replication DNA is semi - conservative came to those conclusions. Predicts possible consequences of a failure in the replication of DNA. For example, a mutation that can alter the function of enzymes and genetic diseases cause . Describe how genes can be activated or inactivated according to the requirements of a protein. For example : in cell metabolism . Explains the general mechanisms of the immune system in distinguishing self and / or gossiping. For example : in transplants , in vaccination or allergies. Explains the coordinated operation of the nervous and endocrine systems in maintaining the internal environment faced with a situation of acute stress. It deduced from data organized in graphics , evidence of endocrine regulation of the water balance body .

Exceptional		Y)…Critically evaluates the relationships between hypotheses concepts , procedures, data , results and conclusions of scientific research related with the functional integration of systems at different levels of biological organization , arguing with depth and considering the context . Assesses the impact on society advancement of scientific knowledge related to the functional integration system, arguing with depth and considering different contexts application and suggests solutions to problems that affect society . Z)… fundamental benefits and / or risks of biotechnology applications in the area of health and production. Eg cloning or genetically modified foods . Explains the mechanisms involved in the neuroendocrine regulation of homeostasis from level molecular to the systemic level. Proposes measures to help mitigate the spread of some diseases. For example : influenza human . Assesses the benefits of gene therapy in the treatment of some diseases. For example, in diabetes .

6c.ii Science Scope and Sequence

Australia - Foundation to Grade 10

The Science scope and sequence is presented in three strands.

- Science Understanding,
- Science as a Human Endeavour and
- Science Inquiry Skills.

The intention is that these three should be taught in an integrated manner.
The table below shows the sub-strands under each of these strand headings, along with detail of their coverage.
There is a useful description of the structure of the science curriculum here:

http://www.australiancurriculum.edu.au/science/content-structure

Chile – Grades 1 to 8

The layout of the Science scope and sequence is similar to that of Australia in some ways but it also has marked differences.
It is also divided into three parts, all under the same umbrella heading 'Learning Objectives'.

- Learning Objective A: Thematic Strands
- Learning Objective B: Skills and Processes of Scientific Investigation
- Learning Objective C: Attitudes

As with the Australian curriculum, it is not intended that these objectives should be addressed independently. Learning experiences should encompass all three simultaneously.
There are parallels between the organisation of traditional science content in Australia's *Science and Understanding* and Chile's *Thematic Strands.*
The structure of Australia's *Science Enquiry Skills* and Chile's *Skills and Processes of Scientific Investigation* is remarkably similar.
However, while there is overlap between Australia's *Science as a Human Endeavour* and Chile's *Attitudes,* the focus of each is very different. The learning in Australia's *Science as a Human Endeavour* relates to the nature and development of Science and the use and influence of Science whereas Chile's stated intention in its *Attitudes* section is to develop attitudes 'related to the subject and aimed at the social and moral development of students'.

Unlike Australia, Chile does not present a separate scope and sequence for each of the three categories of learning. Instead the descriptions of the learning for Learning Objective A: Thematic Strands, incorporate the development of both the skills and processes and the attitudes.

There is more information about the science curriculum here:

http://www.curriculumenlineamineduc.cl/605/w3-article-20871.html

USA

The Common Core of the United States of America does not include Science so there is no scope and sequence to include here.

Australia		Chile	
Strand: Science Understanding		Learning Objective A: Thematic Strands	
There are four sub-strands in *Science Understanding: Biological Sciences; Chemical Sciences; Physical Sciences; Earth and Space Sciences* In this strand the learning descriptions are set out year on year.		This part of the curriculum is divided into the three thematic strands: *Biology, Physics and Chemistry* (combined) plus the *Solar System and the Universe*. Each grade includes a number of units drawn from across the three strands, with the balance between them changing from grade to grade. The learning is set out year on year.	
Sub-strand	Overview of content	Strand	Overview of content
Biological sciences	F: The needs of living things 1: Features of living things, habitats provide needs 2: Growth 3: Offspring 4: Life cycles 5: Interdependence of animals, plants and environment 6: Adaptation to environment; impact of physical conditions on growth and survival 7: Classification, food chains and webs 8: Cell structure and function, organs 9: Organ systems, ecosystems 10: Genetics, evolution	Biology	1: Habits to keep the body healthy and prevent disease; Compare animals according to characteristics such as size, body covering, displacement and habitat 2: Location and function of body parts essential for life: heart, lungs, stomach, skeleton and muscles; Characteristics of animals without backbones such as insects, arachnids, crustaceans compared with vertebrates; Endangered native animals, habitat deterioration, protection 3: Investigate the needs of the plants and their relationship with the root, stem and leaves; Food types, their impact on health and healthy diet 4: Structure and function of parts of the skeleton; Living and non-living parts of an ecosystem and their interaction 5: Cells and their organisation into tissues, organs and systems; Breathing, gas exchange and structures of the respiratory system 6: Functions of the principal structures of the human reproductive system 7: structures and functions of the female and male reproductive system and their relationship to the stages of human development from fertilization, through to puberty; The carbon and nitrogen cycles and their importance to life 8: Animal and plant cell structure and function and their part in the functions of organisms; Theories of the origin of life (creationism, spontaneous generation , chemosynthetic) and evidence that supports or refutes them
Chemical sciences	F: Materials & their properties 1: Physical change 2: Combining materials 3: Change of state - solid to liquid	Chemistry and Physics	1: Types and properties of materials and their uses 2: Water cycle and water as a precious resource

	4: Properties & uses of materials 5: States of matter & properties 6: Reversible and irreversible change 7: Mixtures & separation techniques 8: Particle theory & states of matter, elements, compounds, mixtures, chemical reactions 9: Atomic structure, radioactivity, atoms, chemical reactions and conservation of matter, combustion, reactions of acids, energy transfer 10: Periodic table, types and rates of reaction, use of chemical reactions		3: Distinguish natural and artificial light sources, like the sun, light bulbs and fire 4: Matter has mass and occupies space 5: Conversion of electricity to other forms of energy (heat, sound, light etc.) and the main contributions of scientists to this study 6: Understand energy is needed for life and to change objects and that most energy resources comes directly or indirectly from the Sun; Particulate nature of matter and states of matter 7: Matter is made up of a small number of elements combined, giving rise to a multiplicity of known substances; The effect of forces acting simultaneously on an object in motion or at rest 8: Use atomic models developed over time to explain the structure of matter; Conduction of electricity and heat
Physical sciences	F: Movement, size and shape 1: Light and sound production and these can be sensed 2: Push and pull affecting shape and movement 3: Ways of producing heat and transmission from one object to another 4: Forces exerted by one object on another through direct contact or from a distance 5: Light from a source forms shadows and can be absorbed, reflected and refracted 6: Electrical circuits transferring and transforming electricity, energy from a variety of sources can be used to generate electricity 7: Change to an object's motion is caused by unbalanced forces acting on the object, earth's gravity pulls objects towards the centre of the Earth 8: Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems 9: Energy transfer through different mediums can be explained using wave and particle models 10: Energy conservation in a system can be explained by describing energy transfers and transformations, the motion of objects can be described and predicted using the laws of physics		

Earth and Space sciences	F: Daily and seasonal changes in our environment, including the weather, affect everyday life 1: Observable changes occur in the sky and landscape 2: Earth's resources, including water, are used in a variety of ways 3: Earth's rotation on its axis causes regular changes, including night and day 4: Earth's surface changes over time as a result of natural processes and	Solar System and Universe	1. The daily cycle, differences between day and night, observation of the sun, moon, stars, the brightness of the sky and their effects on living organisms and the environment 2: Not applicable in this grade 3: Characteristics of some of the components of the solar system 4: Layered structure of earth (crust, mantle and core) and distinctive characteristics of each layer

	human activity 5: The Earth is part of a system of planets orbiting around a star (the sun) 6: Sudden geological changes or extreme weather conditions can affect Earth's surface 7: Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon, some of Earth's resources are renewable, but others are non-renewable, water is an important resource that cycles through the environment 8: sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales 9: The theory of plate tectonics explains global patterns of geological activity and continental movement 10: The universe contains features including galaxies, stars and solar systems and the Big Bang theory can be used to explain the origin of the universe Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere		5: Distribution and balance of fresh and salt water on earth 6: Characteristics of the atmosphere, lithosphere and hydrosphere that enable the development of life and measures to protect these layers 7: The range of small and large cosmic structures from asteroids to galaxies and clusters of galaxies 8: The rock cycle and the formation of rocks, minerals and fossils

Australia	Chile
Strand: *Science as a Human Endeavour*	There is no equivalent strand in the Chilean curriculum. As explained above, the *Learning Objective C: Attitudes* section has some overlap with Australia's *Science as a Human Endeavour.*
There are two sub-strands in *Science as a Human Endeavour: Nature and development of Science; Use and influence of Science* In this strand the expected learning descriptions span two years (1-2, 3-4, etc) except for Foundation in the first sub-strand	There are eight categories of attitudes to be developed in the Natural Sciences. These include *curiosity and creativity and the impact of Science on society; the need for rigour and precision in Science; the power of collaboration and teamwork; critical thinking and replicability of results; use of e technology and respect for intellectual property; risks, security and ethics; environmental protection and sustainability; contributions of men and women to Science and the drive to understand our world*. There is no separate scope and sequence for the development of these attitudes. The intention is that the learning should be integrated with that of the thematic strands above.

Nature and development of science	F: Science involves exploring and observing the world using the senses 1-2: Science involves asking questions about, and describing changes in, objects and events 3-4: Science involves making predictions and describing patterns and relationships 5-6: Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena, important contributions to the advancement of science have been made by people from a range of cultures 7-8: Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world, science knowledge can develop through collaboration and connecting ideas across the disciplines of science 9-10: Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community, advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries	Attitudes	No separate scope and sequence
Use and influence of science	1-2: People use science in their daily lives, including when caring for their environment and living things 3-4: Science knowledge helps people to understand the effect of their actions 5-6: Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives, scientific knowledge is used to inform personal and community decisions 7-8: Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations; science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management, people use understanding and skills from across the disciplines of science in their occupations 9-10: People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions; advances in science and emerging		No separate scope and sequence

	sciences and technologies can significantly affect people's lives, including generating new career opportunities, the values and needs of contemporary society can influence the focus of scientific research		

Australia		Chile	
Strand: *Science Inquiry Skills*		Learning Objective B: *Skills and Processes of Scientific Investigation*	
There are five sub-strands in *Science Inquiry Skills:* • *Questioning and predicting;* • *Planning and conducting;* • *Processing and analysing data and information;* • *Evaluating;* • *Communicating* In this strand the expected learning descriptions span two years (1-2, 3-4, etc) except for Foundation which has its own description in sub-strands where it is included		This section is divided into five 'stages'. These align closely with those in the equivalent Australian strand: • *Observe and ask questions;* • *Plan and conduct an investigation;* • *Process and analyse evidence;* • *Evaluating;* • *Communicating* There is no separate scope and sequence for these skills and processes. The intention is that this learning should be integrated with that of the thematic strands above. Many of the unit learning descriptions include words such as 'observe', 'identify', 'describe', 'investigate' and 'distinguish' to suggest how the skills and processes should be developed in the course of learning the subject content.	
Questioning and predicting	F: Respond to questions about familiar objects and events 1-2: Respond to and pose questions, and make predictions about familiar objects and events 3-4: With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge 5-6: With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be 7-8: Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge 9-10: Formulate questions or hypotheses that can be investigated scientifically	Observe and ask questions	No separate scope and sequence
Planning and conducting	F: Explore and make observations by using the senses 1-2: Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources, use informal measurements in the collection and recording of observations, with the assistance of	Plan and conduct an investigation	No separate scope and sequence

	digital technologies as appropriate 3-4: Suggest ways to plan and conduct investigations to find answers to questions, safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate 5-6: With guidance, plan appropriate investigation methods to answer questions or solve problems, decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate, use equipment and materials safely, identifying potential risks 7-8: Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed; in fair tests, measure and control variables, and select equipment to collect data with accuracy appropriate to the task 9-10: Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods, select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data		
Processing and analysing data and information	F: Engage in discussions about observations and use methods such as drawing to represent ideas 1-2: Use a range of methods to sort information, including drawings and provided tables, through discussion, compare observations with predictions 3-4: Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends, compare results with predictions, suggesting possible reasons for findings 5-6: Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or	Process and analyse evidence	No separate scope and sequence

	relationships in data using digital technologies as appropriate, compare data with predictions and use as evidence in developing explanations 7-8: Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate, summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions 9-10: Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies, use knowledge of scientific concepts to draw conclusions that are consistent with evidence		
Evaluating	1-2: Compare observations with those of others 3-4: Reflect on the investigation, including whether a test was fair or not 5-6: Suggest improvements to the methods used to investigate a question or solve a problem 7-8: Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method, use scientific knowledge and findings from investigations to evaluate claims 9-10: Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data, critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems	Evaluating	No separate scope and sequence
Communicating	F: Share observations and ideas 1-2: Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play 3-4: Represent and communicate ideas and findings in a variety	Communicating	No separate scope and sequence

	of ways such as diagrams, physical representations and simple reports 5-6: Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts 7-8: Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate 9-10: Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations		