

Critical and creative thinking

Introduction

In the Australian Curriculum, students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school.

The *Melbourne Declaration on Educational Goals for Young Australians* (MCEETYA 2008) recognises that critical and creative thinking are fundamental to students becoming successful learners. Thinking that is productive, purposeful and intentional is at the centre of effective learning. By applying a sequence of thinking skills, students develop an increasingly sophisticated understanding of the processes they can employ whenever they encounter problems, unfamiliar information and new ideas. In addition, the progressive development of knowledge about thinking and the practice of using thinking strategies can increase students' motivation for, and management of, their own learning. They become more confident and autonomous problem-solvers and thinkers.

Responding to the challenges of the twenty-first century – with its complex environmental, social and economic pressures – requires young people to be creative, innovative, enterprising and adaptable, with the motivation, confidence and skills to use critical and creative thinking purposefully.

Scope of Critical and creative thinking

This capability combines two types of thinking – critical thinking and creative thinking. Though the two are not interchangeable, they are strongly linked, bringing complementary dimensions to thinking and learning.

Critical thinking is at the core of most intellectual activity that involves students in learning to recognise or develop an argument, use evidence in support of that argument, draw reasoned conclusions, and use information to solve problems. Examples of thinking skills are interpreting, analysing, evaluating, explaining, sequencing, reasoning, comparing, questioning, inferring, hypothesising, appraising, testing and generalising.

Creative thinking involves students in learning to generate and apply new ideas in specific contexts, seeing existing situations in a new way, identifying alternative explanations, and seeing or making new links that generate a positive outcome. This includes combining parts to form something original, sifting and refining ideas to discover possibilities, constructing theories and objects, and acting on intuition. The products of creative endeavour can involve complex representations and images, investigations and performances, digital and computer-generated output, or occur as virtual reality.

Concept formation is the mental activity that helps us compare, contrast and classify ideas, objects, and events. Concept learning can be concrete or abstract and is closely allied with metacognition. What has been learned can be applied to future examples. It underpins the elements outlined below.

Dispositions such as inquisitiveness, reasonableness, intellectual flexibility, open- and fair-mindedness, a readiness to try new ways of doing things and consider alternatives, and persistence both promote and are enhanced by critical and creative thinking.

Critical and creative thinking can be encouraged simultaneously through activities that integrate reason, logic, imagination and innovation; for example, focusing on a topic in a logical, analytical way for some time, sorting out conflicting claims, weighing evidence, thinking through possible solutions, and then, following reflection and perhaps a burst of creative energy, coming up with innovative and considered responses. Critical and creative thinking are communicative processes that develop both flexibility and precision. Communication is integral to each of the thinking processes. By sharing thinking, visualisation and innovation, and by giving and receiving effective feedback, students learn to value the diversity of learning and communication styles.

For a description of the organising elements for Critical and creative thinking, go to [Organising elements](#).

Critical and creative thinking across the curriculum

The imparting of knowledge (content) and the development of thinking skills are accepted today as primary purposes of education. The explicit teaching and embedding of Critical and creative thinking throughout the learning areas encourages students to engage in higher order thinking. By using logic and imagination, and by reflecting on how they best tackle issues, tasks and challenges, students are increasingly able to select from a range of thinking strategies and employ them selectively and spontaneously in an increasing range of learning contexts.

Activities that foster critical and creative thinking should include both independent and collaborative tasks, and entail some sort of transition or tension between ways of thinking. They should be challenging and engaging, and contain approaches that are within the ability range of the learners, but also challenge them to think logically, reason, be open-minded, seek alternatives, tolerate ambiguity, inquire into possibilities, be innovative risk-takers and use their imagination.

Critical and creative thinking is addressed through the learning areas and is identified wherever it is developed or applied in content descriptions. It is also identified where it offers opportunities to add depth and richness to student learning in content elaborations. An icon indicates where Critical and creative thinking has been identified in learning area content descriptions and elaborations. A filter function on the Australian Curriculum website assists users to identify F–10 curriculum content where Critical and creative thinking has been identified. Teachers may find further opportunities to incorporate explicit teaching of Critical and creative thinking depending on their choice of activities. Students can also be encouraged to develop capability through personally relevant initiatives of their own design.

- [Critical and creative thinking in English](http://www.australiancurriculum.edu.au/English/General-capabilities)
(<http://www.australiancurriculum.edu.au/English/General-capabilities>)
- [Critical and creative thinking in Mathematics](http://www.australiancurriculum.edu.au/Mathematics/General-capabilities)
(www.australiancurriculum.edu.au/Mathematics/General-capabilities)

- [Critical and creative thinking in Science
\(www.australiancurriculum.edu.au/Science/General-capabilities\)](http://www.australiancurriculum.edu.au/Science/General-capabilities)
- [Critical and creative thinking in History
\(www.australiancurriculum.edu.au/History/General-capabilities\)](http://www.australiancurriculum.edu.au/History/General-capabilities)

Background

This background summarises the evidence base from which the Critical and creative thinking capability's introduction, organising elements and learning continuum have been developed. It draws on foundational and recent international and national research, as well as initiatives and programs that focus on critical and creative thinking across the curriculum.

Critical and creative thinking are variously characterised by theorists as dispositions (Tishman, Perkins and Jay; Ritchhart, Church and Morrison), taxonomies of skills (Bloom; Anderson, Krathwohl et al.), habits and frames of mind (Costa and Kallick; Gardner; de Bono), thinking strategies (Marzano, Pickering and Pollock), and philosophical inquiry (Lipman, Sharp and Oscanyan). Each of these approaches has informed the development of the Critical and creative thinking capability.

The capability is concerned with the encouragement of skills and learning dispositions or tendencies towards particular patterns of intellectual behaviour. These include being broad, flexible and adventurous thinkers, making plans and being strategic, demonstrating metacognition, and displaying intellectual perseverance and integrity. Students learn to skilfully and mindfully use thinking dispositions or 'habits of mind' such as risk taking and managing impulsivity (Costa and Kallick 2000) when confronted with problems to which solutions are not immediately apparent.

Both Gardner (1994) and Robinson (2009) emphasise that we need to understand and capitalise on the natural aptitudes, talents and passions of students – they may be highly visual, or think best when they are moving, or listening, or reading. Critical and creative thinking are fostered through opportunities to use dispositions such as broad and adventurous thinking, reflecting on possibilities, and metacognition (Perkins 1995), and can result from intellectual flexibility, open-mindedness, adaptability and a readiness to experiment with and clarify new questions and phenomena (Gardner 2009). Recent discoveries in neuroscience have furthered theories about thinking, the brain, perception and the link between cognition and emotions. Theorists believe that learning is enhanced when rich environments contain multiple stimuli, stressing the importance of engaging the mind's natural curiosity through complex and meaningful challenges.

Educational taxonomies map sequences of skills and processes considered to be foundational and essential for learning. The most well-known of these, developed by Bloom et al. (1956), divided educational objectives into domains where learning at the higher levels was dependent on having attained prerequisite knowledge and skills at lower levels. In 1967, Bruner and colleagues described the process of concept learning as an active process in which learners construct new concepts or ideas based on their knowledge.

The philosophical inquiry model, first applied to school education by Lipman, Sharp and Oscanyan (1980), has two major elements: critical and creative thinking, and forming a classroom environment called a 'community of inquiry', to support the development of

thinking and discussion skills. This model places emphasis on possibilities and meanings, wondering, reasoning, rigour, logic, and using criteria for measuring the quality of thinking.

Lave and Wenger (1991) described 'learning communities' that value their collective competence and learn from each other. Through their notion of 'authentic' learning, the importance of engagement and linking student interests and preferred learning modes with classroom learning has emerged. Marzano, Pickering and Pollock (2001) identified the strategies most likely to improve student achievement across all content areas and grade levels. These include using non-linguistic representations and learning organisers, and generating and testing hypotheses.

In 2001, Anderson and Krathwohl changed Bloom's cognitive process of 'synthesis' to 'creativity' and made it the highest level of intellectual functioning. They believed the ability to create required the production of an original idea or a product from a unique synthesis of discrete elements.

Twenty-first century learning theories emphasise the importance of supporting authentic and ubiquitous (anywhere, anyhow) learning, and providing students with opportunities, resources and spaces to develop their creative and critical thinking skills (Newton and Fisher 2009; McGuinness 1999, 2010). Gardner's (2009) five 'minds' for the future – the disciplined, synthesising, creating, respectful and ethical minds – offers a helpful starting place. Learners need to develop the skills to analyse and respond to authentic situations through inquiry, imagination and innovation.

References

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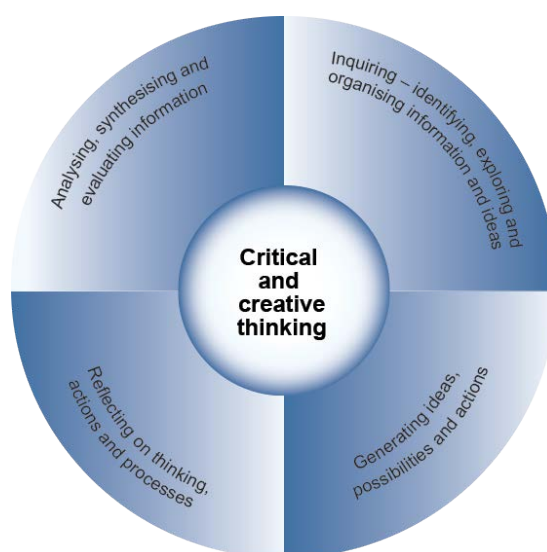
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Organising elements

The Critical and creative thinking learning continuum is organised into four interrelated elements, each detailing differing aspects of thinking. The elements are not a taxonomy of thinking. Rather, each makes its own contribution to learning and needs to be explicitly and simultaneously developed.

- Inquiring – identifying, exploring and organising information and ideas
- Generating ideas, possibilities and actions
- Reflecting on thinking and processes
- Analysing, synthesising and evaluating reasoning and procedures

The diagram below sets out these elements.



Organising elements for Critical and creative thinking

Inquiring – identifying, exploring and clarifying information and ideas

This element involves students in posing questions and identifying and clarifying information and ideas, followed by organising and processing information. When inquiring – identifying, exploring and clarifying information and ideas, students use questioning to investigate and analyse ideas and issues, make sense of and assess information and ideas, and collect, compare and evaluate information from a range of sources. In summary, inquiring primarily consists of:

- pose questions
- identify and clarify information and ideas
- organise and process information.

Generating ideas, possibilities and actions

This element involves students in imagining possibilities and connecting ideas through considering alternatives and seeking solutions and putting ideas into action. Students create new, and expand on known, ideas. They explore situations and generate alternatives to guide actions and experiment with and assess options and actions when seeking solutions. In summary, generating primarily consists of:

- imagine possibilities and connect ideas
- consider alternatives
- seek solutions and put ideas into action.

Reflecting on thinking and processes

This element involves students thinking about thinking (metacognition), reflecting on actions and processes, and transferring knowledge into new contexts to create alternatives or open up possibilities. Students reflect on, adjust and explain their thinking and identify the thinking behind choices, strategies and actions taken. They apply knowledge gained in one context to clarify another. In summary, reflecting primarily consists of:

- think about thinking (metacognition)
- reflect on processes
- transfer knowledge into new contexts.

Analysing, synthesising and evaluating reasoning and procedures

This element involves students in applying logic and reasoning, drawing conclusions and designing a course of action and evaluating procedures and outcomes. Students consider and assess the logic and reasoning behind choices, they differentiate components of decisions made and actions taken and assess ideas, methods and outcomes against criteria. In summary, analysing primarily consists of:

- apply logic and reasoning
- draw conclusions and design a course of action
- evaluate procedures and outcomes.

Critical and Creative Thinking Learning Continuum

Inquiring – identifying, exploring and organising information and ideas

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
Pose questions					
pose factual and exploratory questions based on personal interests and experiences	pose questions to identify and clarify issues, and compare information in their world	pose questions to expand their knowledge about the world	pose questions to clarify and interpret information and probe for causes and consequences	pose questions to probe assumptions and investigate complex issues	pose questions to critically analyse complex issues and abstract ideas
Examples <ul style="list-style-type: none"> asking why events make people happy or sad 	Examples <ul style="list-style-type: none"> asking how and why certain actions and events occurred 	Examples <ul style="list-style-type: none"> asking who, when, how and why about a range of situations and events 	Examples <ul style="list-style-type: none"> inquiring into cause and effect of significant events in their lives 	Examples <ul style="list-style-type: none"> questioning causes and effects of local and world events 	Examples <ul style="list-style-type: none"> questioning to uncover assumptions and inferences and provoke debate about global events
English ACELT1783 Science ACISIS014 History ACHHS017	English ACELA1589 Mathematics ACMSP048 Science ACSH034 History ACHHS049	English ACELA1488 Mathematics ACMSP068 Science ACISIS064 History ACHHS083	English ACELA1517 Mathematics ACMSP118 Science ACISIS231 History ACHHS119	English ACELT1628 Science ACISIS139 History ACHHS150	English ACELT1812 Mathematics ACMSP228 Science ACISIS198 History ACHHS184
Identify and clarify information and ideas					
identify and describe familiar information and ideas during a discussion or investigation	identify and explore information and ideas from source materials	identify main ideas and select and clarify information from a range of sources	identify and clarify relevant information and prioritise ideas	clarify information and ideas from texts or images when exploring challenging issues	clarify complex information and ideas drawn from a range of sources
Examples	Examples	Examples	Examples	Examples	Examples

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
<ul style="list-style-type: none"> identifying what led to a decision being made <p>Science ACSYS233 History ACHHS019</p>	<ul style="list-style-type: none"> exploring patterns and similarities <p>English ACELA1460 Mathematics ACMNA026 Science ACSYS038 History ACHHK051</p>	<ul style="list-style-type: none"> establishing a sequence during investigation of artefact, image or text <p>English ACELT1602 Mathematics ACMMG084 Science ACSYS216 History ACHHSK084</p>	<ul style="list-style-type: none"> giving reasons for a preferred pathway when problem solving <p>English ACELT1602 Mathematics ACMMG142 Science ACSHE081 History ACHHS121</p>	<ul style="list-style-type: none"> identifying the strengths and weaknesses of different approaches <p>English ACELA1548 Mathematics ACMSP206 Science ACSYS144 History ACCHS154</p>	<ul style="list-style-type: none"> scrutinising contrasting positions offered about events or findings <p>English ACELY1749 Mathematics ACMSP246 Science ACSYS203 History ACHHS186</p>
Organise and process information					
gather similar information or depictions from given sources	organise information based on similar or relevant ideas from several sources	collect, compare and categorise facts and opinions found in a widening range of sources	analyse, condense and combine relevant information from multiple sources	critically analyse information and evidence according to criteria such as validity and relevance	critically analyse independently sourced information to determine bias and reliability
<p>Examples</p> <ul style="list-style-type: none"> collecting a variety of representations of particular action(s) <p>English ACELA1430 Science ACSSU005 History ACHHS019</p>	<p>Examples</p> <ul style="list-style-type: none"> finding examples of kindness or change in several sources <p>English ACELA1469 Mathematics ACMMG037 Science ACSYS040 History ACHHK050</p>	<p>Examples</p> <ul style="list-style-type: none"> processing relevant depictions of an event <p>English ACELA1489 Mathematics ACMSP096 Science ACSYS054 History ACHHS084</p>	<p>Examples</p> <ul style="list-style-type: none"> establishing opinion versus fact in literature and film <p>English ACELY1708 Mathematics ACMMG141 Science ACSYS090 History ACHHS122</p>	<p>Examples</p> <ul style="list-style-type: none"> scrutinising the accuracy of depicted events <p>English ACELT1626 Mathematics ACMSP205 Science ACSYS141 History ACCHS151</p>	<p>Examples</p> <ul style="list-style-type: none"> critiquing data from known and unknown sources <p>English ACELT1639 Mathematics ACMSP253 Science ACSYS199 History ACCHS189</p>

Generating ideas, possibilities and actions

Level 1 Typically by the end of Foundation Year, students:	Level 2 Typically by the end of Year 2, students:	Level 3 Typically by the end of Year 4, students:	Level 4 Typically by the end of Year 6, students:	Level 5 Typically by the end of Year 8, students:	Level 6 Typically by the end of Year 10, students:
Imagine possibilities and connect ideas					
use imagination to view or create things in new ways and connect two things that seem different Examples <ul style="list-style-type: none"> changing the shape or colour of familiar objects 	build on what they know to create ideas and possibilities in ways that are new to them Examples <ul style="list-style-type: none"> using a flow chart when plotting actions 	expand on known ideas to create new and imaginative combinations Examples <ul style="list-style-type: none"> exchanging or combining ideas using mind maps 	combine ideas in a variety of ways and from a range of sources to create new possibilities Examples <ul style="list-style-type: none"> by matching ideas from science and history 	draw parallels between known and new ideas to create new ways of achieving goals Examples <ul style="list-style-type: none"> using patterns and trends in Mathematics to arrive at possible solutions in other learning areas 	create and connect complex ideas using imagery, analogies and symbolism Examples <ul style="list-style-type: none"> developing hypotheses based on known and inverted models and theories
Mathematics ACMMG008	English ACELT1591 Mathematics ACMSP047 Science ACSYS037 History ACHHS052	English ACELT1607 Mathematics ACMMG088 Science ACSYS053	English ACELT1618 Mathematics ACMSP147 Science ACSYS107	Mathematics ACMMG197 Science ACSH134 History ACHHS148	English ACELY1756 Mathematics ACMNA239 History ACHHS192
Consider alternatives					
suggest alternative and creative ways to approach a given situation or task Examples <ul style="list-style-type: none"> considering alternative uses for a familiar product 	identify and compare creative ideas to think broadly about a given situation or problem Examples <ul style="list-style-type: none"> considering ways of conserving water in their environment 	explore situations using creative thinking strategies to propose a range of alternatives Examples <ul style="list-style-type: none"> asking 'What if...?' when conducting an investigation 	identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions Examples <ul style="list-style-type: none"> examining the environmental impact of transporting goods 	generate alternatives and innovative solutions, and adapt ideas, including when information is limited or conflicting Examples <ul style="list-style-type: none"> negotiating a solution to a community dispute 	speculate on creative options to modify ideas when circumstances change Examples <ul style="list-style-type: none"> submitting designed and developed ideas or products for further investigation

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1651 Mathematics ACMMMG006 History ACHHS020	English ACELLY1665 Mathematics ACMSP050 Science ACSYS042 History ACHHS052	English ACELY1694 Mathematics ACMSP095 Science ACSYS065 History ACHHK080	English ACELT1800 Science ACSYS104 History ACHHS123	English ACELY1736 Mathematics ACMMMG199 Science ACSHET135 History ACHHS155	History ACHHS193
Seek solutions and put ideas into action					
predict what might happen in a given situation and when putting ideas into action	investigate options and predict possible outcomes when putting ideas into action	experiment with a range of options when seeking solutions and putting ideas into action	assess and test options to identify the most effective solution and to put ideas into action	predict possibilities, and identify and test consequences when seeking solutions and putting ideas into action	assess risks and explain contingencies, taking account of a range of perspectives, when seeking solutions and putting complex ideas into action
Examples <ul style="list-style-type: none"> suggesting different endings to a story 	Examples <ul style="list-style-type: none"> exploring identified problems and ways of overcoming them 	Examples <ul style="list-style-type: none"> using a graphic organiser to suggest alternative solutions 	Examples <ul style="list-style-type: none"> using role plays to test and refine approaches when initial ideas do not work 	Examples <ul style="list-style-type: none"> using information from a range of sources to predict results from an inquiry or investigation 	Examples <ul style="list-style-type: none"> expressing difficult concepts digitally, kin aesthetically or spatially
English ACELY1650	English ACELY1789 Mathematics ACMSP024 Science ACSYS041 History ACHHK045	English ACELA1496 Mathematics ACMNA082 Science ACSYS069	English ACELT1800 Mathematics ACMNA122 Science ACSYS104	English ACELA1548 Mathematics ACMSP204 Science ACSYS140 History ACHHS155	English ACELY1756 Mathematics ACMSP225 Science ACSYS205 History ACHHS190

Reflecting on thinking and processes

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
Think about thinking (metacognition)					
describe what they are thinking and give reasons why	describe the thinking strategies used in given situations and tasks	reflect on, explain and check the processes used to come to conclusions	reflect on assumptions made, consider reasonable criticism and adjust their thinking if necessary	assess assumptions in their thinking and invite alternative opinions	give reasons to support their thinking, and address opposing viewpoints and possible weaknesses in their own positions
Examples <ul style="list-style-type: none"> drawing on a past experience to explain their thinking 	Examples <ul style="list-style-type: none"> describing how they approach tasks when they are not sure what to do 	Examples <ul style="list-style-type: none"> explaining ways they check their thinking and deal with setbacks 	Examples <ul style="list-style-type: none"> identifying where methods of investigation and inquiry could be improved 	Examples <ul style="list-style-type: none"> reflecting on the accuracy of their own and others' thinking 	Examples <ul style="list-style-type: none"> reflecting on justifications for approaching problems in certain ways
English ACELT1783	English ACELT1590 Mathematics ACMNA017 Science ACSYS214	English ACELY1687 Mathematics ACMSP094 Science ACSYS216 History ACHHS085	English ACELY1715 Mathematics ACMNA099 Science ACSYS108 History ACHHS119	English ACELY1731 Science ACSYS145 History ACGHS155	English ACELT1640 Mathematics ACMSP247 Science ACSH194 History ACHHS188
Reflect on processes					
identify the main elements of the steps in a thinking process	outline the details and sequence in a whole task and separate it into workable parts	identify pertinent information in an investigation and separate into smaller parts or ideas	identify and justify the thinking behind choices they have made	evaluate and justify the reasons behind choosing a particular problem-solving strategy	balance rational and irrational components of a complex or ambiguous problem to evaluate evidence
Examples <ul style="list-style-type: none"> identifying steps involved in daily routines 	Examples <ul style="list-style-type: none"> using logic to sort information in graphic organisers or musical segments 	Examples <ul style="list-style-type: none"> examining the significant aspects of an historical event 	Examples <ul style="list-style-type: none"> explaining why particular musical notations or mathematical sequences were 	Examples <ul style="list-style-type: none"> choosing images that best represent an idea or product 	Examples <ul style="list-style-type: none"> exploring reasons for selecting or rejecting patterns or groupings to represent an idea

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1648	English ACELT1592 Mathematics ACMMA044 Science ACSSU030	English ACELT1592 Mathematics ACMMA079 Science ACSSU073 History ACHHK080	English ACELY1709 Mathematics ACMNA128 Science ACSYS110 History ACHHK115	English ACELY1810 Mathematics ACMSP168 Science ACSYS131 History ACHHS154	English ACELA1572 Mathematics ACMSP253 Science ACSYS206 History ACHHS184

Transfer knowledge into new contexts

connect information from one setting to another	use information from a previous experience to inform a new idea	transfer and apply information in one setting to enrich another	apply knowledge gained from one context to another unrelated context and identify new meaning	justify reasons for decisions when transferring information to similar and different contexts	identify, plan and justify transference of knowledge to new contexts
<p>Examples</p> <ul style="list-style-type: none"> giving reasons for rules at home and school 	<p>Examples</p> <ul style="list-style-type: none"> applying reasons for actions previously given to similar new situations 	<p>Examples</p> <ul style="list-style-type: none"> using visual or numerical representations to clarify information 	<p>Examples</p> <ul style="list-style-type: none"> using statistics to interpret information from census data about migration 	<p>Examples</p> <ul style="list-style-type: none"> explaining choices, such as the use of a soundtrack to accompany a performance 	<p>Examples</p> <ul style="list-style-type: none"> demonstrating ways ideas gained in an historical or literary context could be applied in a different scenario
English ACELY1648	English ACELY1666 Mathematics ACMMA028 Science ACSSU031 History ACHHK046	English ACELY1691 Mathematics ACMMA090 Science ACSHE050	English ACELY1616 Mathematics ACMNA133 Science ACSHE220	English ACELY1735 Mathematics ACMMA202 Science ACSYS234 History ACCHS153	English ACELA1565 Mathematics ACMMA238 Science ACSHE158

Analysing, synthesising and evaluating reasoning and procedures

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
Apply logic and reasoning					
<p>identify the thinking used to solve problems in given situations</p> <p>Examples</p> <ul style="list-style-type: none"> asking how dilemmas in narratives were solved <p>English ACELA1786 Mathematics ACMNA289 History ACHHS021</p>	<p>identify reasoning used in choices or actions in specific situations</p> <p>Examples</p> <ul style="list-style-type: none"> asking what course of action was most logical and why <p>English ACELA1462 Science ACSHE035 History ACHHS051</p>	<p>identify and apply appropriate reasoning and thinking strategies for particular outcomes</p> <p>Examples</p> <ul style="list-style-type: none"> using logical or predictive reasoning when problem solving <p>English ACELY1690 Mathematics ACMNA076 Science ACSYS057</p>	<p>assess whether there is adequate reasoning and evidence to justify a claim, conclusion or outcome</p> <p>Examples</p> <ul style="list-style-type: none"> comparing and contrasting interpretations of information or image <p>English ACELT1614 Science ACSYS221</p>	<p>identify gaps in reasoning and missing elements in information</p> <p>Examples</p> <ul style="list-style-type: none"> finding wrong rationales or assumptions made and/or illogical conclusions drawn when seeking outcomes <p>English ACELY1730 Science ACSYS234 History ACHHS152</p>	<p>analyse reasoning used in finding and applying solutions, and in choice of resources</p> <p>Examples</p> <ul style="list-style-type: none"> testing propositions to identify reliability of data and faulty reasoning when designing new products <p>English ACELY1754 Mathematics ACMMG244 Science ACSYS165 History ACHHS187</p>
Draw conclusions and design a course of action					
<p>share their thinking about possible courses of action</p> <p>Examples</p> <ul style="list-style-type: none"> discussing various ways people could have acted 	<p>identify alternative courses of action or possible conclusions when presented with new information</p> <p>Examples</p> <ul style="list-style-type: none"> describing how an outcome might change if a character acted differently 	<p>draw on prior knowledge and use evidence when choosing a course of action or drawing a conclusion</p> <p>Examples</p> <ul style="list-style-type: none"> assessing the worth of elements of a planned approach or solution 	<p>scrutinise ideas or concepts, test conclusions and modify actions when designing a course of action</p> <p>Examples</p> <ul style="list-style-type: none"> charting progress of an argument or investigation and proposing 	<p>differentiate the components of a designed course of action and tolerate ambiguities when drawing conclusions</p> <p>Examples</p> <ul style="list-style-type: none"> assessing the success of a formula for a product or management of an 	<p>use logical and abstract thinking to analyse and synthesise complex information to inform a course of action</p> <p>Examples</p> <ul style="list-style-type: none"> using primary or secondary evidence to support or refute a conclusion

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1646 Mathematics ACMNA005	English ACELA1469 Mathematics ACMNA015 Science ACSYS025 History ACHHK046	English ACELT1604 Mathematics ACMNA073 Science ACSHE062	English ACELY1801 Mathematics ACMNA103 Science ACSYS218 History ACHHS119	English ACELY1732 Mathematics ACMSP171 History ACHHS155	English ACELY1750 Mathematics ACMMG223 Science ACSYS172 History ACHHS189
Evaluate procedures and outcomes					
check whether they are satisfied with the outcome of tasks or actions	evaluate whether they have accomplished what they set out to achieve	explain and justify ideas and outcomes	evaluate the effectiveness of ideas, products, performances, methods and courses of action against given criteria	explain intentions and justify ideas, methods and courses of action, and account for expected and unexpected outcomes against criteria they have identified	evaluate the effectiveness of ideas, products and performances and implement courses of action to achieve desired outcomes against criteria they have identified
Examples <ul style="list-style-type: none"> asking whether their work sounds and looks right and makes sense 	Examples <ul style="list-style-type: none"> asking whether they listened to a peer's answer well or used a suitable procedure 	Examples <ul style="list-style-type: none"> evaluating whether specified materials or calculations were appropriate for set goals or evidence presented 	Examples <ul style="list-style-type: none"> assessing their own and peer responses to an issue, performance or artefact 	Examples <ul style="list-style-type: none"> evaluating whether a chosen investigation method withstands scrutiny 	Examples <ul style="list-style-type: none"> strengthening a conclusion, identifying alternative solutions to an investigation
English ACELY1669 Science ACISIS212	English ACELY1669 Science ACISIS212	English ACELY1695 Mathematics ACMSP097 Science ACSYS058 History ACHHS216	English ACELA1518 Mathematics ACMMG115 History ACHHS216	English ACELA1543 Science ACSYS124 History ACHHS151	English ACELY1752 Mathematics ACMSP283 Science ACSYS171 History ACHHS188