

Connecting the Australian Curriculum: Mathematics Proficiencies and the Bringing it to Life (BitL) tool

AUSTRALIAN CURRICULUM: MATHEMATICS PROFICIENCIES	UNDERSTANDING	REASONING	PROBLEM SOLVING	FLUENCY
<p>What skills and abilities are we developing through an intentional focus on this proficiency?</p>	<p>Students develop the ability to:</p> <ul style="list-style-type: none"> ➤ Build a robust knowledge of adaptable and transferable ideas ➤ Make connections between related ideas ➤ Apply the familiar to develop new ideas 	<p>Students develop an increasingly sophisticated capacity for logical thought and actions, such as:</p> <ul style="list-style-type: none"> ➤ Analysing ➤ Proving ➤ Evaluating ➤ Explaining ➤ Inferring ➤ Justifying ➤ Generalising 	<p>Students develop the ability to:</p> <ul style="list-style-type: none"> ➤ Make choices ➤ Interpret ➤ Formulate ➤ Model ➤ Investigate ➤ Communicate solutions effectively 	<p>Students develop skills in:</p> <ul style="list-style-type: none"> ➤ Choosing appropriate procedures ➤ Carrying out procedures flexibly, accurately, efficiently and appropriately ➤ Recalling factual knowledge and concepts
<p>What does this proficiency look like in action?</p>	<p>What does it look like when students demonstrate understanding?</p> <p>They:</p> <ul style="list-style-type: none"> ➤ Connect related ideas ➤ Represent concepts in different ways ➤ Identify commonalities and differences between aspects of content ➤ Describe their thinking in a subject specific way ➤ Interpret subject specific information 	<p>What does it look like when students demonstrate reasoning?</p> <p>They:</p> <ul style="list-style-type: none"> ➤ Explain their thinking ➤ Deduce strategies ➤ Justify strategies and conclusions ➤ Adapt the known to the unknown ➤ Transfer learning from one context to another ➤ Prove that something is true or false 	<p>What does it look like when students formulate and solve problems?</p> <p>They:</p> <ul style="list-style-type: none"> ➤ Design investigations ➤ Plan approaches ➤ Apply existing strategies to seek solutions ➤ Verify the answers are reasonable 	<p>What does it look like when students demonstrate fluency?</p> <p>They:</p> <ul style="list-style-type: none"> ➤ Produce answers efficiently ➤ Recognise robust ways of answering questions ➤ Choose appropriate methods ➤ Recall definitions ➤ Use facts ➤ Manipulate information and processes
<p>Questions taken from the South Australian tool; 'Bringing it to Life' www.acleadersresource.sa.edu.au</p>	<ul style="list-style-type: none"> • How are these... (values/shapes/angles/questions/graphs/words/number sentences) the same as each other? <i>(for questions with multiple solutions)</i> • How are these... (values/shapes/angles/questions/graphs/words/number sentences) different to each other? <i>(for questions with multiple solutions)</i> • What connections do you see between...? <i>(for questions with multiple solutions)</i> • Which is the odd one out? <i>(for questions with multiple solutions)</i> • What if...(change something), is it still...? • Which is greater/bigger/larger/taller? <i>(for questions with multiple solutions)</i> • Which is less/smaller/shorter? <i>(for questions with multiple solutions)</i> • If the answer is... what might the question have been? <i>(for questions with multiple solutions)</i> • What's missing in this number sentence/from this group/in this pattern? • What might be another way...? • What might be another way to represent that? • What might be another way to work that out? • What might be another way to check that? • What might be another way to do that calculation? • Rename... 	<ul style="list-style-type: none"> • How might you prove that... • Try to convince yourself, someone who thinks differently... • Try not to ask IF you are correct, but instead try to tell when you think that you are correct. Then share HOW you know. • What else might it be? • What might be the best way to record your results, and why? • How come...? • Explain it/why? (to somebody who hasn't been involved in the learning, eg parent, a child in a different class). • Can you show me/us how that works? • Why did you choose to...? • Why is it not... (followed by an incorrect name or process)? • Why can't I... (followed by an incorrect name or process)? • Why are these always the same/ different? • Is there a rule that we could use to describe...? (Have a go) • Is there a rule that always works? (Have a go) • What makes these different processes the same? (Have a go) • Now that you know... can you work out...? (Have a go) • I'm thinking of... (a number/a shape) and I'm going to give you some clues... Can you work out what my number/shape is? (Have a go) • I'm thinking of... (a number/a shape) and I'm going to give you some clues... Can you work out what the possible answers are? (Have a go) • I'm thinking of... (a number/a shape). You can ask questions to help you to work out what it is, but I can only answer yes or no. • You could use sentence structures such as: <ul style="list-style-type: none"> ○ - If... then... ○ - Because I know... I also know... 	<ul style="list-style-type: none"> • What are you being asked to find out or show? • What information is helpful?What information is not useful? Closed questions can be useful to check if the student has accessed the question, eg How many...? How much...? When...? • Do you have an idea? • What could you try? • Have you done a problem like this one before? • How could you test your idea? • How might you start? • Can you represent the problem as a picture or by using equipment? • Would... (counting, a sum, a picture) help? • Can you act it out? • Can you represent the information using numbers and symbols? • What questions could you ask? • When we are being good problem solvers, what do we do to get started? • Speak to someone who you think is being a good problem solver today. Ask them to show you what they are trying. • How might you... (add those numbers together/ subtract that amount/multiply those amounts/ divide those amount)? • What processes might you try? • Does that seem right to you? • How might you check your answer? • Do other people think that too? • Would you like to change your mind and try something different?' • Would you use a different strategy next time? • How efficient was this strategy? • How reliable was this strategy? • Which was easiest for you to understand? • What did you like about...? • What would you do differently now? • How reasonable/realistic is your answer? 	<ul style="list-style-type: none"> • How might you record that mathematically? • How might you... (eg calculate that)? • How might you use a calculator to...? • Can you remember a way to...? • What is the value of... (a calculation that you would expect automatic recall of eg number pairs to 10, to 100, some times tables)? • What is the name of...? • What is the symbol for...? • How many...? • Choose a way to record that mathematically. • Choose a way to... (count/estimate/rename/measure/compare/order/calculate/partition/rearrange/regroup/record/show/represent that). • Use mathematical language to describe... • What would be an efficient way to... (count/measure/order/compare/add on/subtract/multiply/divide/calculate/draw/record)? • How could you...(partition/rearrange/regroup)? • How could you use a calculator to check your answer?