

## Learning Ladder – Posing questions in Mathematics

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|   | 6.2 Pose questions that invite critical reflection   | <p>How can we be sure that ...?<br/>           Tell me what is wrong with ...<br/>           Is it ever false that ...? (always true that ...?)<br/>           Why is ..... the best solution?<br/>           Can you convince me about ...?<br/>           What connections did you make today that helped you to “get it”?<br/>           Critically assess your growth in mathematics this term. What worked and what didn’t?<br/>           What helped you to learn in mathematics this term?</p> |
| Level 6: At this level, students can pose questions to critically analyse complex issues and abstract ideas (Year 10)               | 6.1 Pose questions about concepts and generalisations that invite critical analysis and evaluation         | <p>Of what is this an example?<br/>           What happens in general?<br/>           What happened here? And here? Can you see a pattern?<br/>           Is it always, sometimes, never ...?<br/>           What can change and what has to stay the same so that ... is still true?</p>  |
|   | 5.2 Pose speculative and creative questions, for example, what if? what might?                             | <p>If this is the answer to a similar question, what was the question?<br/>           What might happen if ...?<br/>           What do think comes next? Why?<br/>           What if ...?<br/>           Have we found all the possibilities? How do we know?<br/>           Have you thought of another way this could be done?<br/>           If the data showed X how would you interpret it?<br/>           Can you think of any time that our theory is not true?</p>                             |
| Level 5: At this level, students pose questions to probe assumptions and investigate complex issues (Year 8)                        | 5.1 Pose questions that address propositions and invite an argument  | <p>“Using a number line is more effective than using a hundreds chart.” Do you agree? Why? Why not?<br/>           “We should always use an algorithm to solve number problems” Why? Why not?<br/>           “It is essential to memorise our times tables” To what extent do you agree with this statement?</p>   |
|   | 4.3 Pose evaluative questions, for example, To what extent? How far? that invite an argument               | <p>How far can this pattern help you find an answer?<br/>           Solve .... in two or more ways. Which was the most effective? Why, why not?<br/>           Which was the most effective and why? Will this always be the case?<br/>           What do you think is the most important idea from today’s mathematics lesson?</p>  |
|   | 4.2 Pose analysis questions that compare information and perspectives, using primary and secondary sources | <p>In what way is addition different / similar to multiplication?<br/>           In what way is sharing different / similar to grouping?<br/>           How are six eighths, <math>\frac{3}{4}</math>, .75 and 75% similar and different?<br/>           How does ... compare to ...<br/>           How does .... contrast with ...<br/>           Use a Venn Diagram to show how two topics are the same and different.</p>   |
| Level 4: At this level, students pose questions to clarify and interpret information and probe for causes and consequences (Year 6) | 4.1 Pose analytical questions, for example, opposites  | <p>What strategy worked and what strategy didn’t?<br/>           What problem solving approach was effective and what wasn’t?<br/>           Formula for area – useful or useless?<br/>           Counting on and back – helpful or hindrance?<br/>           Pie chart – effective or ineffective?</p>  |

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|   |  | <b>Addition – efficient strategy or inefficient strategy?</b>  |
| Level 3: At this level, students pose questions to expand their knowledge of the world (Year 4)                                 | 3.1 Pose inquiry/research questions with the emphasis on Why? and How?   | How can this pattern help you ...?<br>Why do you think this?<br>Why did you choose this strategy?<br>How might you solve this in a different way?<br>How could you be more effective / efficient?<br>How will this help you solve ...? |
| Level 2: At this level, students pose questions to identify and clarify issues, and compare information in their world (Year 2) | 2.1 Pose questions that ask for identification of similarities or differences  | What's the same about ...?<br>What's different about ...?<br>Can you sort or organise these in different ways ...?<br>Is it or is it not ...?  |
|   | 1.2 Pose questions that begin with Is, Did, Can, Would, Will, Might, Should  | Can you tell me what's wrong with...<br>What might you change so that...?<br>How might you write/draw/ record what you are doing?<br>Is there a way to record what you've found that might help us see more patterns?                  |
| Level 1: At this level, students pose factual and exploratory questions based on personal interests and experiences (F)         | 1.1 Pose questions that begin with What, When, Where, Why, Which, Who  | What strategy did you choose?<br>Why did you choose it?<br>Is there another?<br>Which strategy is the most efficient?<br>What have we been working on that might help with this problem?   |
|   | <b>Indicative Behaviour</b> Please note that this is not prescriptive and it is not comprehensive. There are many more types of questions that can be asked at each level. | <b>Mathematical context</b><br>Questions apply across the Content Strands.   |

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### References

NRICH Enriching Mathematics, University of Cambridge, 1997- 2017, <https://nrich.maths.org/10341>

Australian National Curriculum, Resources F-6, retrieved 17/8.2017, <http://australiancurriculumf-6resources.blogspot.com.au/2013/04/question-matrix.html>