# Learning sequence – thinking mathematically 2 Stage 1

**Learning sequence description**

This sequence of lessons provides opportunities to deepen critical aspects of number knowledge through tight, targeted teaching and opportunities to apply skills (contexts for enriching learning such as games and investigations). Students will explore the flexibility of numbers and operations whilst also exploring patterns and aspects of measurement. These tasks are designed to support learning in these areas through Working Mathematically.

## Syllabus outcomes

**The following activities provide opportunities for students to demonstrate progress towards the following outcomes. A student:**

**MA1-1WM – describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols**

**MA1-2WM – uses objects, diagrams and technology to explore mathematical problems**

**MA1-3WM – supports conclusions by explaining or demonstrating how answers were obtained**

**MA1-4NA – applies place value, informally, to count, order, read and represent two- and three-digit numbers**

**MA1-5NA – uses a range of strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers**

**MA1-6NA – uses a range of mental strategies and concrete materials for multiplication and division**

**MA1-8WM – uses objects, diagrams and technology to explore mathematical problems**

**MA1-9MG –** measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres

**MA1-15MG –** manipulates, sorts, represents, describes and explores two-dimensional shapes, including quadrilaterals, pentagons, hexagons and octagons

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## What’s (some of) the mathematics? (The purpose/learning intention)

* Numbers can be represented in many different ways. You can use things like pictures, words, symbols and concrete materials
* Mathematicians use a range of representations to communicate ideas
* Different people see and think about numbers and problems in different ways. Listening to other people’s thinking helps us become more flexible in our thinking and reveals mathematical ideas to us.
* Numbers can be broken up into smaller parts (part-part-whole)
  + We can use this as a strategy for mental computation
* Numbers can be related to other numbers in many different ways
  + Some important mathematical relationships that students explore through this sequence include developing confidence with:
  1. +/- 1 and 2 more
  2. How many less/more are needed to reach the nearest multiple of 5
  3. How many less/more are needed to reach the nearest multiple of 10
  4. More, less, same
* Usually, you can solve problems in many different ways
  + Some strategies are more efficient than others
  + An important aspect of efficiency is the number of steps you go through to solve a problem
* When solving problems we can use a range of strategies and relationships such as:
  + ‘make ten’, ‘bridging to ten’ and using ‘landmark numbers’ (typically multiples of tens and fives)
  + 1 or 2 more and less
  + ‘renaming’ and using knowledge of place value
  + Using known facts such as combinations to 10 and 20, doubles and near doubles
  + keeping a ‘constant difference’
* You can quantify a collection in different ways. You can use skills in subitising and visual recognition of structures structures like ten-frames and dice (for example), or you can use counting. You might also use these skills together.
  + When we use groups of 10 we can use our knowledge of place value and numbers (e.g. we can rename)
* A pattern has an element (a repeating core) that repeats over and over and over again.
* The repeating core of a pattern can be the same but look different (like an AB pattern made using biscuits and sultanas and an AB pattern made using a long pencil and a short pencil).
* There are different kinds of patterns, such as repeating patterns (like AB, AAB, ABC, etc.), growing and shrinking patterns (like the counting sequences…10, 9, 8, 7 where you take away 1 each time), patterns like ten-frames and dice patterns have a particular structure that always represents a particular quantity, patterns in combinations, like numbers that combine to make 10. With whole numbers, 7 and 3 is a pattern because when I have 7 of something and I join it with 3 of something, I will have 10 of something. It’s a mathematical regularity.
* Counting involves skills and understanding such as:
  + Matching the words we say to objects that are real or imagined
  + Knowing the counting sequences both forwards and backwards
  + Determining the number after and the number before
  + Starting the count from any number
  + Knowing the last number word tells you how many there are in a collection
  + Knowing you can count a collection in any order and the quantity will be the same.
* You can count the same collection in different ways
* Collections and quantities can look different and have the same value
* We can subitise small collections, up to about 3 or 4 things
* Once collections get bigger than 3 or 4, we can subitise by combining our knowledge of patterns like part-part-whole number knowledge and structures like ten-frames and dice, to help us determine how many there are in a collection
* The more parts you have to share a collection into, the smaller the parts become.
* You can use direct comparison to work out relationships such as more or less, longer or shorter, for example
* We can compare lengths directly by placing objects side-by-side and aligning the ends
* Bigger shapes can be made up of smaller shapes
* We can draw shapes by tracing around the outside of 3D objects

There are numerous skills you might observe from students as they participate in these learning experiences. Teachers are encouraged to use the understandings and skills identified above to form the basis of their assessment focus as well as provide focal points for intentional teaching, reflection and feedback.

It is important to note that for each task, it is highly likely that there are a number of mathematical goals (learning intentions) you may like to draw student’s attention to. Teachers should make decisions based on their knowledge of their students.

## Day 1

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | Dot card talk – 1  Students view video – Dot card talk – 1 |  | Device to watch video  [Dot card talk – 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/dot-card-talk-1) video  [Student workbook (DOCX 5.7MB)](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/key-learning-areas/mathematics/media/documents/mathematics-s1-student-workbook-thinking-mathematically-2.docx)  coloured pencils or markers |
| 1.2 | Race to zero  Students view video – Race to zero  Students play Race to zero.  How to play?  Players place their counters at the end of 119. The person whose birthday is closest to February 29 goes first. Players take turns to spin both spinners and decide which to use, subtracting the amount from their current position. For example, a player rolled 60 and 4. He or she can choose to subtract 60 or 4. Players explain where they need to move their counter to and explain their thinking. If their partner agrees, they move the counter to the corresponding position. Players take turns until someone has been able to land exactly on zero. Students miss a turn if they cannot move. If a roll means they would move into negative numbers, they have to move their counter back to 25.  Another way to play:  Use a 0-119-chart cut into a number strip as a game board  Encourage students to use the structure of the number chart and their knowledge of adding and subtracting by tens and ones to help them work out an answer, especially over the decade.  Encourage students to compare the strategies they used for a particular question with the strategies their partner would use. Have students take turns to model / demonstrate their thinking and then consider what similarities and differences exist. |  | Device to watch video  [Race to zero](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/race-to-zero) video  0-119 bottoms up hundreds chart (game board)  2 spinners  2 counters  1 or 2 paperclips  1 pencil or pen |
| 1.3 | How to make a square  Students view video – How to make a square.  Students make 5 squares for tomorrow’s Pentominoes task. |  | Device to watch video  [How to make a square](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/how-to-make-a-square) video  5 pieces of A4 or A5 paper  scissors |
| 1.4 | Go fish: relationships  Students view video – Go fish: relationships.  Students play +1/ -1 or 2 go fish. |  | Device to view video  [Go fish: relationships](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/go-fish-relationships) video  Playing cards |
| 1.5 | **Opportunity for monitoring student learning**  There are numerous skills you might observe from students as they participate in these learning experiences. Teachers are encouraged to use the understandings and skills identified above to form the basis of their assessment focus as well as provide focal points for intentional teaching, reflection and feedback.  It is important to note that for each task, it is highly likely that there are a number of mathematical goals (learning intentions) you may like to draw student’s attention to. Teachers should make decisions based on their knowledge of their students.   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 2

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Subitising match my collection  Students view video – Subitising match my collection. |  | Device to view video  [Subitising – match my collection](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/subitising-match-my-collection) video  Dried pasta, blocks or counters |
| 2.2 | Let’s talk 1 – Stage 1  Students view video – Let’s talk 1 – Stage 1.  Students record 2 other ways they could solve the problem 23-19. |  | Device to view video  [Let’s talk 1 – Stage 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/lets-talk-1-stage-1) video  Student workbook (DOCX 5.7MB)  Coloured pencils/ markers |
| 2.3 | Pentominoes – 1  Using all the 5 squares made yesterday, students find all the unique shapes they can make. They record their thinking on the grid paper in their student workbook. |  | [Penta Place](https://nrich.maths.org/945)  [Printable for Penta Place](https://nrich.maths.org/content/01/10/bbprob1/RS%20Penta%20Place%20.pdf)  paper squares  Student workbook (DOCX 5.7MB)  Coloured pencils/ markers |
| 2.4 | Go fish: relationships  Students view video – Go fish: relationships  Students play +1/ -1 or 2 go fish. |  | Device to view video  [Go fish: relationships](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/go-fish-relationships) video  Playing cards |
| 2.5 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 3

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 3.1 | Quantifying collections- paddle pop sticks 1  Students view video – Quantifying collections paddle pop sticks |  | Device to view video  [Quantifying collections paddle pop sticks](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/quantifying-collections-paddlepop-sticks-1) video |
| 3.2 | Let’s investigate 1 – Stage 1 and Stage 2  Students view video – Let’s investigate 1 – Stage 1 and Stage 2 |  | Device to view video  [Let’s investigate 1 – Stage 1 and Stage 2](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/lets-investigate-1-stage-1-and-stage-2) video |
| 3.4 | Pentominoes 2  Students investigate what other shapes they can make by joining their pentominoes together. |  | [Penta Place](https://nrich.maths.org/945)  [Printable for Penta Place](https://nrich.maths.org/content/01/10/bbprob1/RS%20Penta%20Place%20.pdf)  paper squares  Pencil  Pentominoes from day 2  Scissors |
| 3.5 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 4

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 4.1 | Which one doesn’t belong? 1  Students view video – Which one doesn’t belong? 1  Students record their ideas in the student workbook and explore which one doesn’t belong dominoes task. |  | Device to view video  [Which one doesn’t belong? 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/which-one-doesnt-belong-1) video  Student workbook (DOCX 5.7MB)  Pencils/ markers |
| 4.2 | Let’s explore 1- Stage 1  Students view video – Let’s explore 1- Stage 1 |  | Device to view video  [Let’s explore 1- Stage 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/lets-explore-1-stage-1) video |
| 4.3 | Concentration - constant difference  Students access the Concentration – constant difference webpage to access cards.  Students play Concentration – constant difference with someone at home.  How to play?  Set up a game of concentration (also known as memory or pairs), by first shuffling the cards well and then placing each card face down. Each player takes a turn by turning two cards over. If the cards match, then the player picks up the cards and keeps them. If they don't match, the player turns the cards back over. A player can also play by themselves. |  | Concentration – constant difference cards (found in [Concentration-constant difference](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/concentration-constant-difference) page)  Scissors |
| 4.4 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 5

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 5.1 | 6 verses 6 – dot talk comparison  Students view video – 6 versus 6 – dot talk comparison.  Students draw a representation of 6 that shows 6 is one less than 7. |  | Device to view video  [6 versus 6 – dot talk comparison](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/6-vs-6-dot-talk-comparison) video  Pencil  Student workbook (DOCX 5.7MB) |
| 5.2 | Let’s generalise 1  Students view video – Let’s generalise 1  Students use any numbers they feel comfortable working with to investigate, what happens with addition? |  | Device to view video  [Let’s generalise 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/lets-generalise-1-stage-1) video  Student workbook (DOCX 5.7MB) |
| 5.3 | Capture ten  (from Cathy Fostnot and Antonia Cameron)  Students view video – Capture ten.  Students play Capture ten. |  | Device to view video  [Capture ten](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/capture-ten) video  Playing cards Ace to 10  Student workbook (DOCX 5.7MB) |
| 5.4 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 6

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 6.1 | reSolve double decker bus part 1  Students view video – reSolve double decker bus part 1. |  | Device to view video  [reSolve double decker bus part 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/esolve-double-decker-bus-part-1) video  Student workbook (DOCX 5.7MB)  pencil |
| 6.2 | youcubed number visuals  (From y[oucubed](https://www.youcubed.org/wp-content/uploads/2019/08/WIM-Number-Visuals-Grades-1-2.pdf))  Students view video – youcubed number visuals.  Students explore the number visuals and record the different ways they see each number visual made up of other numbers. |  | Device to view video  y[oucubed number visuals](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/youcubed-number-visuals) video  Colour pencils  Student workbook (DOCX 5.7MB) |
| 6.3 | Doubles facts concentration  Students access the Doubles facts Concentration webpage to access cards.  Students play Doubles facts concentration with someone at home.  How to play?  Players set up a game of concentration (also known as memory or pairs), by first shuffling the cards well and then placing each card face down. Each player takes a turn by turning two cards over. If the cards match, then the player picks up the cards and keeps them. If they don't match, the player turns the cards back over. Players can also play by themselves. |  | Doubles cards (downloadable from [doubles facts concentration](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/doubles-facts-concentration) page)  Scissors |
| 6.3 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 7

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 7.1 | Dot card talk 4  Students view video – Dot card talk 4 |  | Device to view video  [Dot card talk 4](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/dot-card-talk-4) video |
| 7.2 | reSolve double decker bus part 2  Students view video – reSolve double decker bus part 2  Students choose 3 of their favourite scenarios and share what are at least 2 different strategies to solve each of them. |  | Device to view video  [reSolve double decker bus part 2](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/esolve-double-decker-bus-part-1) video  Pencils  Student workbook (DOCX 5.7MB) |
| 7.3 | Doubles fill  Students view video – Doubles fill.  Students play Doubles fill.  How to play?  Players take turns to spin the 9 spinner (or roll dice) and spin the doubles fill spinner. If a player spins a 6 and spins ‘double’, he or she doubles 6 to make 12, explaining their thinking to their partner who records the number sentence. The player then colours in a corresponding array. Players swap roles. If there is no space on the grid, players miss a turn and play continues until no one is able to add another array. Players then calculate the number of squares they covered and the person with the largest area is the winner.  Other ways to play:  use materials to work out double facts  make up ‘codes’ to show the order in which they made the arrays (see video)  students can rotate and rename the array to use the commutative property, e.g. change 5 twos into 2 fives and colour the corresponding array  change the spinner to include repeated doubling. |  | Device to view video  [Doubles fill](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/doubles-fill) video  Student workbook (DOCX 5.7MB)  9 sided dice or spinner, Doubles fill spinner  1 or 2 paperclips  Pencil/ or pen  colour pencils or markers |
| 7.4 | MathXplosion  Students View episode of [MathXplosion Most people are seven feet tall](https://abcspla.sh/m/2941801)  Students view video MathXplosion 7 feet follow up and complete task. |  | Device to view video  [MathXplosion 7 feet follow up](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/mathxplosion-7-feet-follow-up) video  Scissors  Paper  Pencil or marker |
| 7.5 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 8

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 8.1 | Counting with understanding – up to 100  Students view video Counting with understanding up to 100 and complete task. |  | Device to view video  [Counting with understanding - up to 100](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/counting-with-understanding-up-to-100) video  Cup or container  Collection of small items for example dried pasta |
| 8.2 | 6 is…  Students view video – 6 is…  Students complete task: What are all the different ways we can make 6?  with just 1 colour pencil?  with 2 different colours?  with 3 different colours? |  | Device to view video  [6 is…](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/6-is) video  Coloured pencils  Blocks or paperclips  Student workbook (DOCX 5.7MB) |
| 8.3 | Numberblocks – Stampoline  Students view episode of ‘[Numberblocks – Stampolines](https://www.youtube.com/watch?v=rsg6NCdu5FA​)’ (optional)  Students view video of ‘Numberblocks – Stampolines’ follow up.  Students investigate:  What are all the different shapes Six could make playing Stampolines?  Can they come up with at least 5 different and new ways? |  | episode of ‘[Numberblocks – Stampolines](https://www.youtube.com/watch?v=rsg6NCdu5FA)’ (optional)  Device to view video  [‘Numberblocks – Stampolines’ follow up](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/numberblocks-stampolines-follow-up) video  Coloured pencils  Student workbook (DOCX 5.7MB) |
| 8.4 | Go fish: teen/-ty numbers  Students access the Go fish: teen/-ty numbers webpage to access cards.  Students play go fish using the teen/-ty number cards with someone at home. |  | [Go fish: teen/-ty numbers cards](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/go-fish-teen-ty-numbers) downloadable  scissors |
| 8.5 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 9

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 9.1 | About how many paperclips? – 1  Students view video About how many paperclips? – 1 and complete task. |  | Device to view video  [About how many paperclips? – 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/about-how-many-paperclips) video |
| 9.2 | About how many paperclips? – 2  Students view video About how many paperclips? – 2 and complete task. |  | Device to view video  [About how many paperclips? – 2](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/about-how-many-paperclips) video  Pencil  Drawing from Day 8’s task |
| 9.3 | Turn over 3  Students view video Turn over 3.  Students play Turn over 3.  How to play?  Using playing cards Ace-10 (representing 1-10) and the jokers (representing 0), shuffle the cards into a pile. Place the pile face down between two players. Take turns to turn over the top three cards. Players look for doubles, near doubles, combinations to 10 and 20. Players keep the cards of any known facts they identify and know, justifying their thinking to their partner who records it on the recording sheet. Any unused cards are placed into a discard pile. Players continue taking turns until the cards run out. When then happens, is a reshuffle all of the unused cards. Re-distribute them into 3 piles and continue playing. The winner is the player with the highest cumulative total at the end of 5 rounds.  Variation: For subtraction, choose which cards to combine using known facts and then subtract the third card. Players are able to keep all three cards if they are able to identify a known fact and then subtract the third value, explaining your mental computation to the other player. |  | Device to view video  [Turn over 3](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/turn-over-3) video  Student workbook (DOCX 5.7MB)  Pencils  Playing cards Ace-10 |
| 9.5 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

## Day 10

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 10.1 | Subitising 6 – one less than  Students view video on Subitising 6 – one less. |  | Device to view video  [Subitising 6 – one less](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/targeted-teaching/subitising-6-one-less-than) video |
| 10.2 | Numberblocks  Students view the video Numberblocks – step patterns. |  | Device to view video  [Numberblocks – step patterns](https://youtu.be/W6i-11Flmnw). video |
| 10.3 | Capture ten  (from Cathy Fostnot and Antonia Cameron)  Students view video – Capture ten.  Students play Capture ten. |  | Device to view video  [Capture ten](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-1/contexts-for-practise/capture-ten) video  Playing cards Ace to 10  Student workbook (DOCX 5.7MB) |
| 10.3 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) * To be determined * To be determined |  |  |

**Reflection and evaluation**

These simple questions may help you reflect on your students’ learning and plan for next steps.

What worked well and why?

What didn’t work and why?

What might I do differently next time?

What are the next steps for student learning based on the evidence gathered?