# Learning sequence thinking mathematically 3 Early Stage 1

**Learning sequence description**

This sequence of lessons provides opportunities to deepen critical aspects of early 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

**MAe – 1WM** – describes mathematical situations using everyday language, actions, materials and informal recordings

**MAe – 2WM** – uses objects, actions, technology and/or trial and error to explore mathematical problems

**MAe – 3WM** – uses concrete materials and/or pictorial representations to support conclusions

**MAe – 4NA** – counts to 30, and orders, reads and represents numbers in the range 0 to 20

**MAe – 5NA** – combines, separates and compares collections of objects, describes using everyday language, and records using informal methods

**MAe – 6NA** – groups, shares and counts collections of objects, describes using everyday language, and records using informal methods

**MAe –7NA** – describes two equal parts as halves

**MAe – 8NA** – recognises, describes and continues repeating patterns

**MAe – 10MG** – describes and compares areas using everyday language

**MAe – 12MG** – describes and compares the masses of objects using everyday language

**MAe – 15MG** – manipulates, sorts and describes representations of two-dimensional shapes, including circles, triangles, squares and rectangles, using everyday language

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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
* Mathematical representations like diagrams need to include relevant mathematical information
* 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)
* 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 and 2 more
  + How many less/more are needed to reach the nearest multiple of 5
  + How many less/more are needed to reach the nearest multiple of 10
  + More, less, same
* Usually, you can solve problems in many different ways
* When solving problems we can use a range of strategies and relationships such as:
  + Using known facts such as combinations to 10 and 20, doubles, near doubles
  + Adjusting quantities (by visualising them change or by changing them)
  + Counting by ones
  + Using skip counting
* You can quantify a collection in different ways. You can use skills in subitising and visual recognition of 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 (for example we can rename)
  + We can skip count when working with composite units (like fours or twos)
* A pattern has an element (a repeating core) that repeats over and over and over again.
* 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.
* Making reasonable estimates requires us to use evidence (but not to calculate precisely)
* 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
* Bigger shapes can be made up of smaller shapes
* We can use a pan balance to investigate and compare mass by placing objects on either side of a pan balance to obtain a level balance
* We can describe mass using comparative language such as heavier, heaviest, heavy, etc.

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

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| --- | --- | --- | --- |
| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | Counting sounds 1  Students view video – Counting sounds 1 and complete tasks as they watch the video. |  | Device to watch video  [Counting sounds 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/counting-sounds)  Student workbook |
| 1.2 | Staircase pattern  Students view videos and complete tasks after each video in their student workbook, using grid paper to draw their structures.  Staircase patterns K and S1 – part 1  Staircase pattern K – part 2  Students may like to view the episode of Numberblocks step squad.  (Adapted from [AAMT Top Drawer Teachers Making a staircase](https://topdrawer.aamt.edu.au/Patterns/Big-ideas/Growing-patterns/Making-a-staircase) and [AAMT Top Drawer Growing patterns](https://topdrawer.aamt.edu.au/Patterns/Big-ideas/Growing-patterns)) |  | Device to watch video  [Staircase pattern videos](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/staircase-pattern)  Student workbook  Colour pencils/ markers  [Numberblocks step squad](https://numberblocks.fandom.com/wiki/Step_Squads) video |
| 1.3 | **Opportunity for monitoring student learning**  Teachers should use what they know about their students and information at the beginning of this document to make decisions about what they need to focus on as they use these tasks. Some aspects you may like to focus on today include:   * When students are counting, are they   + Saying number words in order?   + Able to match each number word to an object?   + Able to count backwards within a similar range they can count forward?   + Able to represent and visualise quantities within their counting range?   + Able to explain that the last number word spoken describes the total amount in a collection? * Can students describe spatial and numerical aspects of the structure? (Do they notice things such as the shape, the number of cubes, changes to quantities in each row and/or each column, different ways of counting/combining collections to determine ‘how many?’, symmetry, and links to multiplicative thinking, etc.?) * Can students represent their ideas on grid paper? How do they draw the structure? For example, do they colour in each square individually? Do they notice the dimensions of each column and represent that as a ‘block’? * To be determined |  |  |

## Day 2

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Introducing rekenreks  Students view video – Introducing rekenreks and record their response to the task in their student workbook. |  | Device to view video  [Introducing rekenreks video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/introducing-rekenreks)  Student workbook  Colour pencils/ markers |
| 2.2 | Balancing numbers 1  (Inspired by the work of Dan Meyer)  Students view videos and respond to the tasks after each video in their student workbook.  Balancing numbers 1 – part 1  Balancing numbers 1 – part 2  Balancing numbers 1 – part 3 |  | Device to view video  [Balancing numbers 1 videos](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/balancing-numbers-1)  Student workbook  Colour pencils/ markers |
| 2.3 | Staircase pattern follow up  Students view video – Staircase pattern K – part 2 follow up and record their response to the task in their student workbook. |  | Device to view video  [Staircase pattern K – part 2 follow up](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/staircase-pattern-follow-up)  Student workbook  Colour pencils/ markers  Collection of objects like blocks or unfix cubes |
| 2.4 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * Do students recognise that a balanced scale represents equivalence? * Do students use evidence to make reasonable estimates (but do not feel the need to calculate precisely)? * What detail do students include in their mathematical drawings? * To be determined |  |  |

## Day 3

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 3.1 | Make a rekenrek  This learning experience will need the support of an adult to collect the materials and make a rekenrek.  When we involve children in making mathematical tools, we help them make meaning from them. By making a rekenrek, we can focus attention on the structure of the beads (2 fives in each row) and practise fine-motor skills and skills in counting.  Rekenreks help children recognise the structure of numbers from 0 to 20. They help build relationships to fives and tens, work with number combinations, and build flexible strategies for addition and subtraction with 1- and 2-digit numbers.  Students with an adult view the video – How to make a rekenrek and together they make a rekenrek. |  | Device to view video  [How to make a rekenrek video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/how-to-make-a-rekenrek)  glue (wood glue or hot glue)  4 pegs  10 red beads and 10 blue beads (or 10 of any 2 colours you like)  2 paddle pop sticks  2 kebab sticks  4 wall plugs  An adult to help |
| 3.2 | Balancing numbers 2  (Inspired by the work of Dan Meyer)  Students view videos and respond to the tasks after each video in their student workbook.  Balancing numbers 2 – part 1  Balancing numbers 2 – part 2  Balancing numbers 2 – part 3  Balancing numbers 2– part 4 |  | Device to view video  [Balancing numbers 2 videos](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/balancing-numbers-2)  Student workbook  Colour pencils/ markers |
| 3.3 | Handfuls – thinking  multiplicatively  Students view video – Handfuls – multiplicative thinking and record their response to the task in their student workbook. |  | Device to view video  [Handfuls – thinking multiplicatively video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/handfuls-multiplicative-thinking)  Collection of items like bears, LEGO mini figs or an alternative like toy cars, trains, animals, etc. |
| 3.4 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * Do students recognise that a balanced scale represents equivalence? * Do students use evidence to make reasonable estimates (but do not feel the need to calculate precisely)? * Do students reason mathematically to explain 46 paddle pop sticks will be equivalent in mass to 15 teddies as both collections weigh the same as the Hulk? * What knowledge do students use when participating in Handfuls? Do they use familiar structures, doubles facts, derived facts, partitioning of numbers, etc.? * To be determined |  |  |

## Day 4

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 4.1 | Rekenreks 1  Students view video – Rekenreks 1 and record their responses to the tasks in their student workbook. |  | Device to view video  [Rekenreks 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/rekenreks-1)  Rekenrek  Student workbook  Colour pencils/ markers |
| 4.2 | Rekenrek duel: level 1  Students view video – Rekenrek duel: level 1.  Students play Rekenrek duel: level 1. |  | Device to view video  [Rekenrek duel: level 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/rekenrek-duel-level-1)  Rekenrek  set of numeral cards 0-20  Student workbook  Colour pencils/ markers |
| 4.3 | Make a tangram  Students view video – How to make a tangram  This learning experience will need the support of an adult. |  | Device to view video  [How to make a tangram video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/how-to-make-a-tangram)  Pair of scissors  Square piece of paper |
| 4.4 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * How do students move beads on their rekenreks? Do they move them in chunks or by ones? Do they use ‘left behind’ strategies (1 or 2 less)? Do they explain how they see ‘chunks’ and how they know how many there are by describing part-part-whole relationships and their ability to subitise, etc.? * To be determined |  |  |

## Day 5

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 5.1 | Rekenreks noticing doubles and near doubles  Students view video – Rekenreks 2 to notice doubles and near doubles.  Students play Rekenreks noticing doubles and near doubles and record their games in their student workbook. |  | Device to view video  [Rekenreks 2 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/rekenreks-2)  Rekenrek  Pencil  [Printed copies of 10-frame cards](https://drive.google.com/open?id=1Y8r7c5bcBduyuI1vI68st1DAH9ofKxRB)  Pair of scissors  Student workbook |
| 5.2 | Tangram puzzles  Students use their Tangram to create the Tangram puzzles. |  | Device to visit [tangram puzzles](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/tangram-puzzles) (optional)  Tangram  Student workbook |
| 5.3 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * How do students move the tangram pieces around to create the shapes? Do they apply knowledge of sliding, flipping and turning the puzzle pieces when combining shapes? * How well do students persevere when trying to solve problems they find tricky? * Are students able to identify and describe doubles and near-doubles? * To be determined |  |  |

## Day 6

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 6.1 | Handfuls  Students view video – Handfuls.  Students play Handfuls and record their thinking in their student workbook. |  | [Handfuls video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/handfuls)  Counters, lima beans or pasta  Colour pencils/ markers  Student workbook |
| 6.2 | Balancing numbers 3  (Inspired by the work of Dan Meyer and Graham Fletcher)  Students view videos and respond to the tasks after each video in their student workbook.  Balancing numbers 3 – part 1  Balancing numbers 3 – part 2  Balancing numbers 3 – part 3 |  | Device to view video  [Balancing numbers 3 videos](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/balancing-numbers-3)  Student workbook  Pattern block set with hexagons, triangles and trapeziums.  Colour pencils/ markers |
| 6.3 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * Can students organise collections using what they know about patterns like ten-frames, dice, and dominoes (for example)? Are they able to arrange and describe the same collection in different ways? Do they ‘trust’ how many are in a collection once they’ve determined to total? * To be determined |  |  |

## Day 7

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 7.1 | Let’s talk 3 – part 1  Students view video – Let’s talk 3 – part 1. |  | Device to view video  [Let’s talk 3 – part 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/lets-talk-3-part-1) |
| 7.2 | Power dot pro (using Tiny Polka Dots)  (From Dan Finkel, Math for love)  Dan Finkel and the Math for Love team have generously allowed us to share the Tiny Polka Dot starter kit with our NSW DoE schools. The [Tiny Polka Dot printer-friendly starter deck](https://www.dropbox.com/s/9kvxby8qa3oxay4/Tiny%20Polka%20Dot%20Print%20and%20Play%20%28light%20version%2C%20printer%20friendly%29.pdf?dl=0) is available for printing. Download it, print and cut out the cards to start playing. Instructions in English are available in the file, while Spanish, Mandarin and French are up on the [website](https://mathforlove.us5.list-manage.com/track/click?u=ec800e78e9062d9a9af4fe5b2&id=d8181d29e6&e=05fa88dfa4). Video instructions are on their website too.  Students view video – Tiny polka dots – power dot pro  Students play Tiny polka dots – power dot pro |  | Device to view video  [Power dot pro video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/tiny-polka-dots)  [Downloadable tiny polka dot](https://www.dropbox.com/s/9kvxby8qa3oxay4/Tiny%20Polka%20Dot%20Print%20and%20Play%20%28light%20version%2C%20printer%20friendly%29.pdf?dl=0) |
| 7.3 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * How do students determine the solution to problems involving addition? Do they use visual representations of numbers to support their thinking and explaining of mathematical ideas? Do they imagine quantities moving? Do they use counting strategies? Do they have number facts they know and use? * Are students able to determine which collection has the most? * To be determined |  |  |

## Day 8

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 8.1 | Let’s talk 3 – part 2  Students view video – Let’s talk 3 – part 2 |  | Device to view video  [Let’s talk 3 – part 2 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/lets-talk-3-part-2) |
| 8.2 | Number busting  Students view video –Number busting  Student play number busting using 6 or 9 and respond to the task in their student workbook. |  | Device to view video  [Number busting](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/number-busting) video |
| 8.4 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * Do students offer a various way to ‘bust’ a number? Do they describe numbers by partitioning them into 2 parts (for example 8 is 4 and 4)? Do they partition them into 3 or more parts (for example 8 is 4 and 3 and 1)? * Do students describe numbers in terms of their relationships to other ‘wholes’. For example; Do they describe 8 as 2 less than 10, 12 less than 20, 3 more than 5, etc.? * To be determined |  |  |

## Day 9

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 9.1 | Splat!  (Adapted from Steve Wyborney)  Students view video – Splat and complete task as they watch the video. |  | Device to view video  [Splat! Video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/targeted-teaching/splat)  Student workbook  Colour pencils/ markers |
| 9.2 | Rekenrek duel: level 1  Students view video – Rekenrek duel: level 1.  Students play Rekenrek duel: level 1. |  | Device to view video  [Rekenrek duel: level 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/rekenrek-duel-level-1)  Rekenrek  set of numeral cards 0-20  Student workbook  Colour pencils/ markers |
| 9.3 | **Opportunity for monitoring student learning**  Some aspects you may like to focus on today include:   * Do they subitise (perceptually and conceptually)? * Do students use a range of efficient strategies when solving problems? Do they use related addition and subtraction facts? Do they use mental imagery? * Do students explain their thinking when solving problems * To be determined |  |  |

## Day 10

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 10.1 | ABC educational resources  ABC TV Education, in collaboration with the NSW Department of Education, have planned a daily schedule of free to air educational programs. Select a resource to use from Lower primary (Years K-2) |  | [Lower primary (Years K-2). website](https://education.nsw.gov.au/teaching-and-learning/learning-from-home/teaching-at-home/teaching-and-learning-resources/non-department-resources/abc-educational-resources/lower-primary-) |
| 10.2 | 3 tens in a row  Students view video – 3 tens in a row.  Students play 3 tens in a row.  How to play  Draw a 3x3 grid as a game board (like noughts and crosses game board).  Players take turns to roll the dice and write the number in one of their boxes.  The goal is to be able to write two numbers in each box that combine to make 10.  Players continue taking turns until a player has been the first to make 3 tens in a row |  | Device to view video  [3 tens in a row video](https://sites.google.com/education.nsw.gov.au/get-mathematical-early-stage-1/contexts-for-practise/3-tens-in-a-row) Student workbook  Colour pencils/ markers |
| 10.3 | **Opportunity for monitoring student learning**   * (to be determined by teachers using the mathematical purposes identified at the beginning of the document) |  |  |

**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?