# Mathematics Stage 3 learning sequence

**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. These tasks are designed to support learning in these areas through working mathematically.

## Syllabus outcomes and content

**MA3-1WM** describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions

**MA3-2WM** selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations

**MA3-3WM** gives a valid reason for supporting one possible solution over another

**MA3-4NA** orders, reads and represents integers of any size and describes properties of whole numbers

**MA3-5NA** selects and applies appropriate strategies for addition and subtraction with counting numbers of any size

**MA3-6NA** selects and applies appropriate strategies for multiplication and division, and applies the order of operations to calculations involving more than one operation

**MA3-8NA** **–** analyses and creates geometric and number patterns, constructs and completes number sentences, and locates points on the Cartesian plane

**MA3-9MG** **–** selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length

**MA3-10MG** **–** elects and uses the appropriate unit to calculate areas, including areas of squares, rectangles and triangles

**MA3-14MG** **–** identifies three-dimensional objects, including prisms and pyramids, on the basis of their properties, and visualises, sketches and constructs them given drawings of different views

**MA3-15MG** **–** manipulates, classifies and draws two-dimensional shapes, including equilateral, isosceles and scalene triangles, and describes their properties

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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 diagrams, words, symbols and materials and technologies to represent them.
* Mathematicians use a range of representations and materials to communicate ideas and solve problems
* Different people think about quantities and problems in different ways
* Numbers can be broken up into smaller parts (part-part-whole)
  + We can use this as a strategy for mental computation
  + You can partition composite units too, for example, 3 sixes can be partitioned in 3 fours and 3 twos.
* Numbers can be related to other numbers in many different ways
* 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)
  + Applying an understanding of place value by partitioning, regrouping and renaming
  + Using known number facts such as familiar multiplication facts, combinations to 10 and 20, doubles, and near doubles
  + keeping a ‘constant difference’
  + using derived facts (using known facts to work out unknown facts)
  + using the commutative, associative and distributive properties
  + using doubling and halving
  + using the distributive property, e.g. 15 × 9 is the same as 10 x 9 + 5 × 9
  + Use inverse operations
* The decimal point does not move but you can multiply and divide numbers to make them easier to work with
* 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.
* 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.
* Collections and quantities can look different and have the same value
* Shapes can have different perimeters and still have the same area
* The total distance around a two-dimensional shape as perimeter
* Investigate and represent three-dimensional objects using drawings

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 | Imagining fractions 1  Students view video – Imagining fractions 1 video. |  | Device to watch video  [Imagining fractions 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/imagining-fractions-1)  Student workbook  Pencil |
| 1.2 | Dicey addition  (adapted from [NRICH maths](https://nrich.maths.org/13261))  Students view video– Dicey addition.  Students play Dicey addition. |  | Device to watch video  [Dicey addition video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/dicey-addition)  0-9 spinner  Pen  Paperclip  Student workbook  Pencil |
| 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-3/targeted-teaching/how-to-make-a-square)  video  5 pieces of A4 or A5 paper  Pair of scissors |
| 1.4 | 101 and you’re out  Students view video – 101 and you’re out  How to play?  Students make a game board by drawing a 6 x 4 table. Label the first column as ‘tens’, the second column as ‘ones’, the third column as number and forth column as total. Each time you roll the dice (or flip a card) you have to decide whether the number is representing ‘ones’ or ‘tens’. For example, if I roll a 3, I could use it as 3 ones (3) or 3 tens (which we rename as 30). If you choose to use your 3 as 3 ones, record the number in the ones column. If you choose to use your 3 as 3 tens (30), record your number in the left column. Continue to play for six rolls. Once you write a number, you can’t change it. The winner is the player with the sum that is closest to 100 without going over!  Draw up 4 new game boards. Using the same numbers you rolled, use the game boards to get closer to 100 than you did in your first game.  Play again with someone at home!  Other ways to play:  Increase the challenge by using numbers from 0-9. You can also use playing cards, make cards or make a spinner at home.  Roll the dice 4 times and only use four lines on the game board.  This game can be played individually, competitively or collaboratively. |  | Device to watch video  [101 and you’re out video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-2/contexts-for-practise/101-and-yourre-out)  Dice or numeral cards 1-6  Pencils or markers  Student workbook |
| 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 | Let’s talk 1 – Stage 3  Students view video – Let’s talk 1 – Stage 3 |  | Device to watch video  [Let’s talk 1 – Stage 3 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-talk-1-stage-3)  Student workbook  Pencil |
| 2.2 | 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)  5 paper squares  Student workbook  Coloured pencils/ markers |
| 2.3 | Super shapes  (Adapted from [NRICH](https://nrich.maths.org/1056) maths) |  | Device to watch video  [Super shapes](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/super-shapes?pli=1) video  Student workbook  Pencil |
| 2.4 | **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 3

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 3.1 | Dot card talk 3  Students view video – Dot card talk 3 |  | Device to watch video  [Dot card talk 3 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/dot-card-talk-3) |
| 3.2 | Let’s investigate 1 – S3  Students view video – Let’s investigate 1 – S3 |  | Device to watch video  [Let’s investigate 1 – S3](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-investigate-1-stage-3) video  Student workbook  Pencil |
| 3.3 | Pentominoes 2   * (Adapted from [Pentominoes zoo](https://abarothsworld.com/Puzzles/Polyominoes/Pentomino%20Zoo.htm))   Students cut out their pentominoes and investigate what other shapes they can make by joining their pentominoes together.  Then they are challenged to form a rectangle with the smallest and largest possible perimeter. |  | [Penta Place](https://nrich.maths.org/945)  [Printable for Penta Place](https://nrich.maths.org/content/01/10/bbprob1/RS%20Penta%20Place%20.pdf)  Pencil  Pentominoes from day 2  Pair of scissors |
| 3.4 | **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 4

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 4.1 | Which one doesn’t belong? 2  (From [Which one doesn’t belong?](http://wodb.ca/numbers.html))  Students view video – Which one doesn’t belong? 2 |  | Device to watch video  [Which one doesn’t belong? 2](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/which-one-doesnt-belong) video  Student workbook  Pencil |
| 4.2 | Let’s explore 1  Students view video – Let’s explore 1  Students reflect on the strategies they used to solve the problem and identify the most efficient strategy they used. |  | Device to watch video  [Let’s explore 1 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-explore-1-stage-3)  Student workbook  Pencil |
| 4.3 | Origami cube  Students view video – Origami cube  Students create 1 or 2 cubes. |  | Device to watch video  [Origami cube](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/origami-cube) video |
| 4.3 | **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 5

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 5.1 | Let’s generalise 1  Students view video – Let’s generalise 1  Students investigate what happens with addition. |  | Device to watch video  [Let’s generalise 1](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-generalise-1-stage-3) video  Student workbook  Pencil |
| 5.2 | Net exploration  Students view video Net exploration  Students investigate the 11 ways to make a net for a cube. |  | Device to view video  [Net exploration video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/net-exploration)  Pair of scissors  Pencil  Paper |
| 5.3 | Look Kool cubes episode  Students watch Series 1 Look Kool cubes episode on [ABC iview](https://iview.abc.net.au/show/look-kool) |  | Device to view Series 1 ABC Look Kool episode cubes |
| 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 | youcubed number visuals  (from [youcubed](https://www.youcubed.org/wim/number-visuals-3-5/))  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  [youcubed number visuals video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/youcubed-number-visuals)  Colour pencils  Student workbook |
| 6.2 | Brushloads  (from [NRICH](https://nrich.maths.org/4911))  Students view video – Brushloads and compete tasks. |  | Device to watch video  [Brushloads video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/brushloads)  Student workbook  Pencil |
| 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 | Same...and different  (Using [youcubed](https://www.youcubed.org/wim/number-visuals-3-5/) and [mathforlove](https://mathforlove.com/lesson/prime-climb-color-chart/))  Students view video – Same...and different |  | Device to watch video  [Same...and different video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/same-and-different)  Student workbook  Pencil |
| 7.2 | Area vs perimeter  Students are reminded of the pentomino challenge they had where they needed to form rectangles with the largest possible perimeter and smallest possible perimeter using their pentomino pieces.  Students watch MathXplosion – area vs perimeter before being challenged to record as many rectangles they can that have an area of 60 squares. |  | Device to watch video  Student workbook  [MathXplosion –area vs perimeter](https://education.abc.net.au/home#!/media/2971335/area-vs-perimeter) video  [Area vs perimeter page](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/area-vs-perimeter) |
| 7.3 | Let’s talk 2 – S3  Students view video – Lets talk 2 – S3 |  | Device to watch video  [Lets talk 2 – S3 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-talk-2-s3)  Student workbook  Pencil |
| 7.4 | **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 8

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 8.1 | Let’s investigate 2 S3  Students view video – Let’s investigate 2 S3 |  | Device to watch video  [Let’s investigate 2 S3](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-investigate-2-s3)  [video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/lets-investigate-2-s3)  Student workbook  Pencil |
| 8.2 | reSolve bakery - part 1  Students view video – reSolve bakery - part 1 |  | Device to watch video  [reSolve bakery - part 1  video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/resolve-bakery-task-part-1)  Student workbook  Pencil  Paper |
| 8.3 | youcubed math cards  (from [math cards youcubed](https://www.youcubed.org/resources/math-cards-3-6-video/))  Students play youcubed math cards.  You can play this game like Memory or Concentration. Using the youcubed math cards, you are aiming to match cards with the same value shown through different representations. Lay all the cards down on a table and then take turns to pick them up, looking for a match.  For example 9 fours can be shown with an area model, a set of objects such as dominoes, and the number sentence (equation) as well as the product, 36. When players match the cards they should explain how they know that the different cards are equivalent in value. |  | [Math cards handout](https://www.youcubed.org/tasks/math-cards/) downloadable cut out  [youcubed math cards page](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/contexts-for-practise/youcubed-math-cards)  Pair of scissors |
| 8.4 | **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 9

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 9.1 | Broken calculator  (Adapted from [mathforlove](https://mathforlove.com/lesson/broken-calculator-warmup/))  Students view video – Broken calculator |  | Device to watch video  [Broken calculator video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/contexts-for-practise/broken-calculator)  Student workbook  Pencil |
| 9.2 | reSolve bakery task – part 2  Students view video – reSolve bakery task – part 2. |  | Device to watch video  [reSolve bakery task – part 2 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/resolve-bakery-task-part-2)  Student workbook  Pencil  Paper |
| 9.3 | Dicey Addition  Students view video – Dicey Addition  Play Dicey addition again – but this time, create a game board using multiplication or division. |  | Device to watch video  [Dicey addition video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/contexts-for-practise/dicey-addition)  Student workbook  Pencil |
| 9.4 | **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 10

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 10.1 | reSolve bakery task – part 3  Students view video –reSolve bakery task – part 3 |  | Device to watch video  [reSolve bakery task – part 3 video](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/targeted-teaching/resolve-bakery-task-part-3)  Student workbook  Pencil  Paper |
| 10.2 | Multiplication toss – (from learning sequence a)  Students view video –Play multiplication toss – (from learning sequence a)  This is a variation of multiplication toss from Professor Dianne Siemon and the Victorian Department of Education  A version of this game race to 100 can also be found on [youcubed](https://www.youcubed.org/tasks/how-close-to-100/).  This game is useful for representing multiplicative situations using arrays and regions, exploring the commutative and distributive properties, enhancing reasoning skills and supporting learning about number facts.  How to play?  You can play this by yourself or players take turns to spin the spinners. If a 3 and 6 are spun, players can enclose either block out 3 rows of 6 (3 sixes) or 6 rows of 3 (6 threes). The game continues with no overlapping areas. The winner is the player with the largest area blocked out after 10 spins. Eventually the space on the grid paper gets really small.  Then, you have to think:  What if my 3 sixes won’t fit as 3 sixes or as 6 threes?  Players can partition to help them! So, for example, I can rename 3 sixes as 2 sixes and 1 six (if that helps me fit the block into my game board). |  | Device to watch video  [Play multiplication toss](https://sites.google.com/education.nsw.gov.au/get-mathematical-stage-3/contexts-for-practise/multiplication-toss) – (from learning sequence a)  0-9 spinner  Colour pencils or markers  Paperclip  Student workbook |
| 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?