Stage 6 Mathematics Life Skills

## MLS – N2 Mathematical modelling

### Overview

| MLS-N2 Mathematical modelling | Unit Duration |
| --- | --- |
| Number and Modelling focuses on the use of number properties and patterns to understand mathematics and its application to meaningful contexts.  | Teacher decision |

| Subtopic focus | Outcomes |
| --- | --- |
| Mathematical modelling is the term used to describe and interpret relationships between quantities. The focus of this subtopic is exploring simple mathematical models of real-life situations and representing them visually. The knowledge, skills and understanding in this subtopic builds on Life Skills Years 7 – 10 outcomes and content for Number and Algebra. | A student:* Explores mathematical concepts, reasoning and language to solve problems MALS6-1
* Engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
* Demonstrates understanding of number and patterns in a range of contexts MALS6-7
* Solves problems using number and patterns in real-life situations MALS6-8
* Engages with mathematical skills and techniques, including technology, to investigate, explain and organise information MALS6-13
* Communicates mathematical ideas and relationships using a variety of strategies MALS6-14
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| Related Mathematics Standard outcomes | ****Related Numeracy CEC outcomes**** |
| MS11-1, MS11-2, MS11-6, MS11-9, MS11-10, MS1-12-1, MS1-12-2, MS1-12-6, MS1-12-9, MS2-12-1, MS2-12-2, MS2-12-6, MS2-12-9, MS2-12-10 | N6-1.1, N6-1.2, N6-2.1, N6-2.3, N6-2.4, N6-2.5, N6-3.1, N6-3.2 |

All outcomes referred to in this unit come from the [Stage 6 Mathematics Life Skills Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-life-skills-2017)
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### Adjustments

Examples of adjustments can be found on the NESA website under [Adjustments](https://www.educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/adjustments).

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| Student’s name | Adjustments |
| e.g. John Smith | Requires learning material to be printed on blue paper. |
|  |  |

### Unit of learning

| ContentStudents learn to: | Suggested teaching strategies and resources | Differentiation and modifications | Date and initial |
| --- | --- | --- | --- |
| N2.1: Patterns* recognise patterns in the environment, for example
* In nature
* In the home
* In the classroom
* In the workplace
* In pictures
* Online  Information and communication technology capability icon Personal and social capability icon
 | Recognise patterns in the environment* Make connections to students’ individual interests and experiences by showing them stimulus material of images from familiar environments that contain patterns. Students to communicate what they notice about the stimulus material.

**Resource:** can-you-see-a-pattern.DOCX* Students to discuss what they believe makes a pattern and teacher guides students into creating a definition or set of rules for creating a pattern. For example: students may mention that a pattern requires repetition.
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| * recognise, copy and continue **shape** and number patterns
* create **shape** and number patterns Critical and creative thinking icon
* describe **shape** and number patterns informally, for example:
* ‘the house numbers on this side of the street are all odd and go up by twos’ Literacy icon
 | Recognise, copy, continue, create and describe shape patterns**Teacher note:** Teacher to watch the 3-part video on exploring patterns. Note you will need to scroll down on the website page to view the pattern videos. These videos are not designed for students to watch more for teachers to learn how to run activities and facilitate appropriate discussions. Duration: 7-8 minutes**Videos:** [Let’s explore patterns](https://sites.google.com/education.nsw.gov.au/es1-math-digital-resource-1/lets-explore-patterns)* Teacher to facilitate classroom discussion around how objects can be grouped, what patterns can look like and how to predict what would come next in a pattern. Use the ‘Exploring patterns’ PowerPoint resource to guide the discussion

**Resource:** exploring-patterns.PPTX* Students create their own patterns with either objects or by drawing. Examples can be found on the last slide of the ‘Exploring Patterns’ PowerPoint. Alternatively, students could create beaded bracelets.

**Resource:** beaded-patterns.DOCX* **Extension:** Students could investigate the number of squares required to build staircases. This could be done by using blocks or simply using images. Details of this activity can be found on the YouCubed website. See: [Squares to stairs](https://www.youcubed.org/tasks/squares-to-stairs/)
 |  |  |
| * recognise, copy and continue shape and **number** patterns
* create shape and **number** patterns Critical and creative thinking icon
* describe shape and **number** patterns informally, for example:
* ‘the house numbers on this side of the street are all odd and go up by twos’ Literacy icon
 | Recognise, copy, continue, create and describe number patterns* Teacher to help students make connections between number patterns and their knowledge of times tables.
* Teacher to write the numbers 5, 10, 15 on the board and ask students if they know what number would come next
* Students to communicate their reasoning around what they believe the next number on the pattern would be. Students to communicate answers to the following types of questions: *“How do you know 20 comes next?” “What number are we adding on each time?” “Does the pattern ever end?”*
* Teacher to write the numbers 1, 6, 11 and repeat the process. Students to communicate their reasoning behind their decision of what the next number should be.
* Students to create their own patterns and ask the person next to them what number would come next and what the rule to the pattern is. This could be done as a whole class activity where students write their pattern on the board and ask the class the probing questions.
* Teacher to draw upon student’s knowledge of their own house numbers. Ask students what number their house is and what number that think their neighbours’ houses are. Students could then complete the ‘House Number’ activity.

**Resource:** house-numbers.DOCX * **Extension:** Explore the famous Fibonacci number sequence.

**Resources:** Students watch the YouTube video “[Math in the world around us: Fibonacci Sequence](https://www.youtube.com/watch?v=ihxJN6ZC9HE)” and complete the worksheet. See: fibonacci-sequence-activity.DOCX |  |  |
| * develop a rule for a given number pattern and express it mathematically, for example:
* The rule is add three to the previous term
* Multiply the term number by five
* Use the number rule 2 x ? to get each term in the pattern Critical and creative thinking icon Literacy icon
 | Develop a rule for a number pattern* Students to create shapes using match sticks.
* Start off with a square and ask them to record how many match sticks they used.
* Get students to create 2 squares and ask them to record how many match sticks they used.
* Continue this process and facilitate a discussion around what they notice about the numbers, whether they have seen this pattern of numbers before (they may associate it with their 4 times tables) and see if they can predict how many match sticks they would need for a higher number of squares without them having to use match sticks.

**Resource:** The Nrich website have an activity that explores the same idea using triangles however provides possible extensions. See: [Sticky triangles](https://nrich.maths.org/88) |  |  |
| N2.2: Modelling* model real-life problems using concrete materials and/or diagrams, for example:
* find the number of chairs needed for a certain number of tables in a café by actually setting up tables and chairs, or by drawing a diagram Critical and creative thinking iconPersonal and social capability icon Work and enterprise icon
* complete tables of values based on a simple rule in the context of a real-life situation, for example:
* the number of chairs needed for a certain number of tables is ‘number of tables x 4’ Critical and creative thinking icon Work and enterprise icon
 | Model real-life problems* Students to engage in the online learning activity “Maximising seating arrangements”. This activity is scaffolded and designed for students to independently investigate different table arrangements and the maximum number of people they can seat.

**Resource:** DESMOS activity [Maximising seating arrangements](https://teacher.desmos.com/activitybuilder/custom/5f07ddd80f33754508adcb58). |  |  |
| * develop rules based on the models created, for example:
* generalise a situation to develop a rule, eg the number of chairs needed for a certain number of tables is ‘number of tables x 4’
 | Develop rules based on models**Teacher note:** Teacher to watch Dr Chris Matthew’s demonstrate how to run the Growing Patterns activity. Duration: first 11 minutes of a 32-minute keynote. **Video:** [Dr Chris Matthews (keynote Part 2) Aboriginal Education Conference, Adelaide, August 2018](https://www.youtube.com/watch?v=T2VM1ThnDLs&feature=emb_logo)* Teacher to facilitate the ‘Growing patterns’ activity as outlined in the above video.
* Students investigate spiral patterns formed by drawing dots and extend their ability to define a rule for a pattern into linear relationships.
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| * read, interpret and draw conclusions from graphs that model real situations, for example:
* use a graph of blood alcohol content levels over time to estimate when a person could safely drive a car after drinking alcohol Critical and creative thinking icon Personal and social capability icon
 | Read, interpret and draw conclusions from graphs* Teacher to facilitate a discussion around how a person’s BAC depends on a variety of different factors. For example: a person’s weight, how many standard drinks they have consumed, how many hours they have been drinking for, how long it has been since their last drink.
* Teacher to pose scenarios to the students, for example you have been drinking for 4 hours and have had 10 standard drinks
* Students to use the Google sheet, [BAC calculator](https://docs.google.com/spreadsheets/d/1vo5xYO9J0fOxbxVdBDhA5jR-uIDltE6xmbjvDKUiXis/edit?usp=sharing), to investigate what their BAC reading would be and how many hours it would take for their BAC to reach zero.
* Teachers may also like to extend the conversation to what is a standard drink and how many standard drinks are in each of the different types of alcoholic beverages**Resource:** [Standard drinks poster](https://drinkwise.org.au/about-us/resources/)
 |  |  |
| * display data from experiments or real-life situations in simple graphs, for example:
* plot the cost of filling the petrol tank against the number of litres of petrol required on a line graph Personal and social capability icon
* complete a table of values from a graph, for example:
* tabulate the population of the school over the past five years from a line graph of this data Critical and creative thinking icon
* use digital technology to create graphs from tables of data or tables from graphs  Information and communication technology capability icon
 | Display data using digital technology* Students are to engage in the online learning activity “Cost of petrol”. This activity is scaffolded and designed for students to independently draw and interpret line graphs and complete tables of value based on the cost of petrol.

**Resource:** DESMOS activity [Cost of petrol](https://teacher.desmos.com/activitybuilder/custom/5f90e85ebd3a6339b0bd87c0) |  |  |
| * describe trends evident in graphs of data, for example:
* determine a line of best fit on a height-weight graph and describe trends, eg taller people tend to weigh more, while still recognising that there are individuals who do not fit this trend Critical and creative thinking icon Literacy icon
 | Describe trends evident in graphs and data* Students are to engage in the online learning activity “Trends in data”. This activity is scaffolded and designed for students to independently investigate the relationship between a person’s height and the length of their foot and describe trends seen in a variety of other graphs.

**Teacher note:** students will need to measure their height and the length of their foot before engaging in the DESMOS activity.**Resource:** DESMOS activity [Trends in data](https://teacher.desmos.com/activitybuilder/custom/5f76a985440b320c8785ee31) |  |  |

### Evaluation

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### Glossary

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| Term | Description |
| graph | a drawing or picture that shows how two different types of information are related |
| pattern | a series of sequence that repeats according to a rule |
| trend | a change over time |

### Supplementary resources

* [Triangle numbers](https://nrich.maths.org/5525) – an activity from the Nrich website that investigates triangle numbers (i.e. 1, 3, 6, 10 etc).
* [Holes](https://nrich.maths.org/6529) – an activity from the Nrich website that investigates how many cubes it takes to build larger cubes with holes taken out of the centre.
* [One step, two step](https://nrich.maths.org/1step2step) – an activity from the Nrich website that investigates different ways people can walk up (or down) a flight of stairs containing 12 steps if a person is limited to being about to take only one or two steps at a time.
* [Go forth and generalise](https://nrich.maths.org/2338) – an activity from the Nrich website that is an extension on the ‘one step, two step’ problem.
* [Painted cube](https://www.youcubed.org/tasks/painted-cube/) – an activity from the Youcubed website that investigates the number of painted sides on individual cubes forming larger cubes.
* [Circle Fever](https://www.youcubed.org/tasks/circle-fever/) – an activity from the Youcubed website that investigates making patterns out of circles.