# Mathematics – K-2 multi-age – Year A – Unit 11



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## Unit description and duration

This two-week unit provides further develops students' knowledge, understanding and skills of place value and number representation. Students are provided opportunities to:

* connect counting and numerals to quantities
* quantify, organise and represent large collections
* identify part–whole relationships in numbers up to 10
* demonstrate equivalence using mass and number combinations
* investigate mass and time
* describe the position of themselves and pathways between locations.

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### Student prior learning

Before participating in these teaching and learning activities, students would benefit from prior experience with:

* modelling, reading and writing combinations of numbers to 10 using materials, representations, words and symbols
* subitising small collections
* counting to at least 100 and matching objects one-to-one
* counting by tens.

## Lesson overview and resources

The table below outlines the sequence and approximate timing of lessons; syllabus focus areas and content groups; and resources.

|  |  |  |
| --- | --- | --- |
| Lesson | Syllabus focus area and content groups | Resources |
| [**Lesson 1: Large collections**](#_Lesson_1:_Battleship)  60 minutes  Large collections can be quantified, organised and represented in different ways. | **Representing whole numbers**  **Early Stage 1**   * Use the counting sequence of ones flexibly * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Use counting sequences of ones with two-digit numbers and beyond * Represent the structure of groups of ten in whole numbers   **Stage 1 – Part B**   * Use countingsequences of ones and tens flexibly * Forming groups   **Forming groups**  **Early Stage 1**   * Investigate and form equal groups by sharing   **Stage 1 – Part A**   * Count in multiples using rhythmic and skip counting | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * Large collection of objects. For example, blocks, cubes, counters, craft sticks |
| [**Lesson 2: Counting with handfuls**](#_Lesson_2:_Counting)  60 minutes  Large collections can be quantified, organised and represented in different ways. | **Representing whole numbers**  **Early Stage 1**   * Use the counting sequence of ones flexibly * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Represent the structure of groups of ten in whole numbers   **Stage 1 – Part B**   * Form, regroup and rename three-digit numbers   **Combining and separating quantities**  **Stage 1 – Part A**   * Use flexiblestrategies to solve addition and subtraction problems   **Forming groups**  **Early Stage 1**   * Investigate and form equal groups by sharing   **Stage 1 – Part A**   * Count in multiples using rhythmic and skip counting | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * Large collection of counters * Large number line (masking tape or chalk) * Large collection of objects. For example, blocks, cubes, counters, craft sticks * Sticky notes * Writing materials |
| [**Lesson 3: Place value**](#_Lesson_3:_Place)  60 minutes  Numbers can be partitioned in different but equivalent ways. | **Representing whole numbers**  **Early Stage 1**   * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Represent the structure of groups of ten in whole numbers   **Stage1 – Part B**   * Form, regroup and rename three-digit numbers   **Combining and separating quantities**  **Stage 1 – Part A**   * Use flexible strategies to solve addition and subtraction problems | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * [Resource 2: Make a number](#_Resource_2:_Build) * [Resource 3: Build a number](#_Resource_3:_Build_1) * [Resource 4: Build a two-digit number](#_Resource_3:_Build) * [Resource 5: Build a number assessing game play](#_Resource_4:_[Interview) * 0-3 dice * 0-6 dice * 0-9 dice * Interlocking cubes * MAB blocks * Writing materials |
| [**Lesson 4: Busting numbers**](#_Lesson_4:_Busting)  60 minutes  Numbers can be partitioned in many different ways. | **Representing whole numbers**  **Early Stage 1**   * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Represent the structure of groups of ten in whole numbers   **Stage 1 – Part B**   * Form, regroup and rename three-digit numbers   **Combining and separating quantities**  **Early Stage 1**   * Model additive relations and compare quantities * Identify part-whole relationships in numbers up to 10   **Stage 1 – Part A**   * Use flexible strategies to solve addition and subtraction problems * Represent equality   **Non-spatial measure**  **Early Stage 1**   * Mass:Identify and compare mass using weight   **Stage 1 – Part A**   * Mass:Investigate mass using an equal-arm balance | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * 0-10 number cards or playing cards * Craft sticks or elastic bands * Equal-arm balance * Interlocking cubes * MAB blocks * Writing materials |
| [**Lesson 5: Compare 2 number lines**](#_Lesson_5:_Compare)  60 minutes  Numbers can be compared through different representations. | **Representing whole numbers**  **Early Stage 1**   * Use the counting sequence of ones flexibly * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Represent numbers on a line   **Non-spatial measure**  **Early Stage 1**   * Tell time on the hour on analog and digital clocks   **Stage 1 – Part A**   * Tell timeto the half-hour   **Stage 1 – Part B**   * Tell timeto the quarter-hour using the language of ‘past’ and ‘to’ | * [Resource 6: Hour and minute numbers](#_Resource_5:_Hour) printed on A3 paper * 3 long ropes * 24 pegs or pieces of tape * Class set of student clocks * Numbers 0-12 written on A4 paper in blue * Numbers 0-60 (counting by 5) written on A4 paper in red * Writing materials |
| [**Lesson 6: How many seeds?**](#_Lesson_6:_How)  60 minutes  Patterns are helpful when quantifying large collections. | **Representing whole numbers**  **Early Stage 1**   * Recognise number patterns * Connect counting and numeralsto quantities   **Stage 1 – Part A**   * Represent the structure of groups of ten in whole numbers   **Stage 1 – Part B**   * Use counting sequences of ones and tens flexibly   **Combining and separating quantities**  **Early Stage 1**   * Identify part-whole relationships in numbers up to 10   **Stage 1 – Part A**   * Recognise and recall number bonds up to ten | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * [Resource 7: How many seeds?](#_Resource_7:_Pumpkin) * [Digital spinner](https://www.didax.com/apps/spinners/) * Large collection of dice (10-20 per small group) * Writing materials |
| [**Lesson 7: Sorting seeds**](#_Lesson_7:_Sorting)  60 minutes  Large collections can be quantified, organised and represented in different ways. | **Representing whole numbers**  **Early Stage 1**   * Use the counting sequence of ones flexibly * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Use counting sequences of ones with two-digit numbers and beyond * Represent the structure of groups of ten in whole numbers   **Stage 1 – Part B**   * Use counting sequences of ones and tens flexibly   **Forming groups**  **Early Stage 1**   * Record grouping and sharing   **Stage 1 – Part A**   * Count in multiples using rhythmic and skip counting | * [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) * [Resource 8: Pumpkin patch problem](#_Resource_8:_Pumpkin) * [Resource 9: Packets of seeds](#_Resource_9:_Packets) * [Resource 10: Need for seeds](#_Resource_10:_Need) * Writing materials |
| [**Lesson 8: Position on a grid**](#_Lesson_8:_Position)  60 minutes  There are patterns to the way numbers are formed. | **Representing whole numbers**  **Early Stage 1**   * Use the counting sequence of ones flexibly * Connect counting and numerals to quantities   **Stage 1 – Part A**   * Use counting sequences of ones with two-digit numbers and beyond * Represent the structure of groups of ten in whole numbers   **Geometric Measure**  **Early stage 1**   * Describe position and movement of oneself   **Stage 1 – Part A**   * Follow direction to familiar locations | * [Resource 11: Number chart](#_Resource_11:_Number) * [Resource 12: Stage 1 snakes and ladders](#_Resource_9:_Stage) * [Resource 13: Early Stage 1 snakes and ladders](#_Resource_10:_Early) * [Resource 14: 0-30 snakes and ladders](#_Resource_11:_0-30) * Counters * Dice * Writing materials |

## Lesson 1: Large collections

**Core concept:** Large collections can be quantified, organised and represented in different ways.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * collections of objects can be organised and quantified in many ways * some ways of quantifying collections are more efficient than others. | Students working towards Early Stage 1 outcomes can:   * count out a given number of objects from a larger collection * use strategies (like a ten-frame) to keep track of a count.   Students working towards Stage 1 outcomes can:   * use counting strategies, for example, twos, fives and tens to count large collections * understand the equivalent relationship between 10 ones and one 10 * arrange objects to represent collections of 10. * use counting and ordinal names (for example, the third box)   In addition, students working towards Stage 1 outcomes can:   * give and follow instructions, including turns (for example, go forward 2 places, turn left, then move forward one box) * use spatial and positional language to describe position, direction and movement in different ways (for example, next to the chair, behind the table, on the carpet and below the fan) * draw or recreate more complex images. |

### Daily number sense: Guess the mystery number – 10 minutes

1. Build student understanding of how to describe and locate numbers by asking mathematical questions to find numbers on a number chart.
2. Using a [digital number chart](https://www.didax.com/apps/120-board/), colour all the squares and select a mystery number. Students ask questions to find the answer. Set a goal of uncovering the mystery number in 10 questions or less.
3. Students may ask questions such as:

* Is the number more than...?
* Is the number less than...?
* Is the number between...?
* Is it an odd number?
* Is it an even number?
* Does the number end in zero?

1. Record questions to encourage reflection on which questions eliminated the highest number of possibilities.
2. After each question, clear the board of the relevant numbers until the mystery number remains.

**Note:** Alternate number charts to provide Early Stage 1 students with a range from zero to 20 and Stage 1 students with a range from zero to 120.

### Counting large collections – 20 minutes

This lesson has been adapted from [Counting Large Collections](https://www.resolve.edu.au/counting-large-collections) by [reSolve: Maths by Inquiry](https://www.resolve.edu.au/) (2020).

1. Provide pairs or small groups with a large collection of objects, for example, over 50 objects. Ask Stage 1 students to estimate and record how many objects are in the collection. Stage 1 students count the total and Early Stage 1 students count out 27 objects from the larger collection.

**Note:** Purposely disrupt the count so that students need to start again. This will lead into future discussions about keeping track of what has and has not been counted.

1. After students have found their totals, discuss the counting strategies used by asking questions such as:

* What counting strategy did you use?
* How are you sure that the total is correct?
* Did you successfully maintain the count?
* What happened when you were disrupted?

1. Early Stage 1 students add the 27 objects back into the larger collection of objects. Stage 1 students check their total and Early Stage 1 students count out 27 objects from the larger collection. This time, as they count, encourage students to think about how they could organise the objects more efficiently.

**Note:** Students should consider the way they order the count. This should lead to efficient and effective counting strategies and allow the place value properties to be seen. For example, using groups of 10. During this count, take photographs of the different strategies that students use so that you can compare them. Look for examples of structured and unstructured groups.

### Discuss and connect the mathematics – 10 minutes

1. After students have checked the total, compare their findings by asking how the different strategies used are reflected in the way students have organised the count. Display the photographs and have students explain why they structured their count this way (see Figure 1).

Figure 1 – Structured and unstructured groups

A collection of 6 images. The top row has 3 images, the first image is a structured count of twos, the second image is a structured count of tens and the third image is a structured count of fives. The bottom row has 3 images. The first image is an unstructured count of twos, the second image is an unstructured count of tens and the third image is an unstructured count of fives.



1. Focus the discussion on the difference between a structured and unstructured group. Ask:

* Which way of organising the objects made it easier to tell how many there were without having to count?
* Which way of organising the objects made it easier for you to ‘trust’ that there were 10 there without having to count?
* What do you notice about the way we organise the objects and the way we record the number?
* Which structure did you prefer?

1. Which way of quantifying your collection was the most efficient?

**Note:** At this point of the discussion students need to visualise the structure of 10 and identify how that structure can help to efficiently organise the count. The focus for Stage 1 is to identify that 10 ones are the same as one 10. These discussion questions can be revisited after 'consolidation and meaningful practise’.

### Consolidation and meaningful practice – 20 minutes

1. Have students count their collection again with a focus on structuring their count and seeing 10 ones as one 10.

**Note:** Disrupt the count again to create an opportunity for students to reflect on the benefits of using an effective method to maintain their count.

1. Stage 1 students continue to count other large collections of items to consolidate their understanding of efficient counting methods and the understanding that 10 ones are one 10.
2. Early Stage 1 students continue to count out a specified number of objects from a larger collection and structure their count.

**Forming groups:** This helps students progress from ‘counting by ones’ to ‘skip counting’ and ‘using repeated addition’. These are important steps towards understanding the idea of coordinating units and multiplication.

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for:   * Are students able to count out a given number of objects from a larger collection? **(MAE-RWN-01)** * Do students understand that 10 ones are the same as one 10? **(MA1-RWN-01, MA1-RWN-02)** * What strategies are students using to calculate their total? **(MAO-WM-01, MA1-FG-01)** * How are students counting objects? By ones? Twos? Tens? **(MAE-RWN-01, MAE-FG-02, MA1-RWN-01, MA1-FG-01)** * How are students organising their objects? For example, small equal groups, ones, in a line, making towers or by forming structures like ten-frames or dice patterns. **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MAE-FG-02, MA1-RWN-01, MA1-FG-01)**   What to collect:   * photos of students’ work **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MA1-RWN-01)** | Students are not confident counting out a given number of objects from a larger collection or are unable to keep track of the count.   * Support students to count objects one-to-one by physically moving the objects into different piles as students count. Ask students how many objects they have and highlight that the last number word said indicates how many objects have been counted. * Have students arrange the objects in a line and recount (noting where they have said the incorrect number). Ask students what number comes before or after the incorrect number. * Explain to students that they should keep spaces between collections to show which ones have been counted and which ones have not. Demonstrate the benefits of using spaces between collections.   Students are not confident using place value knowledge to rename collections of 10 ones as one 10 to help determine how many there are.   * Provide students with [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1). * Help students visualise collections of 10 by physically grouping objects in a clear cup. | Students count a large collection of objects.   * Ask students if there are different ways that they can organise their collection. * Ask students to record different strategies for working out how many counters there are. For example, making collections of 10 and then renaming to make collections of fives, so students can use known facts.   Students describe a range of strategies for quantifying the same collection. Ask students to make an argument for which strategy they believe is most efficient. Students will need to provide evidence to support their argument. |

## Lesson 2: Counting with handfuls

**Core concept:** Large collections can be quantified, organised and represented in different ways.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * collections of objects can be organised and quantified in many ways * some ways of quantifying collections are more efficient than others. | Students working towards Early Stage 1 outcomes can:   * collect a given number of objects from a larger collection * use structures like a ten-frame to assist in keeping track of the objects being counted.   Students working towards Stage 1 outcomes can:   * count large collections using counting strategies, for example, twos, fives and tens * understand that 10 ones can be renamed as one 10 * organise objects to represent collections of 10. |

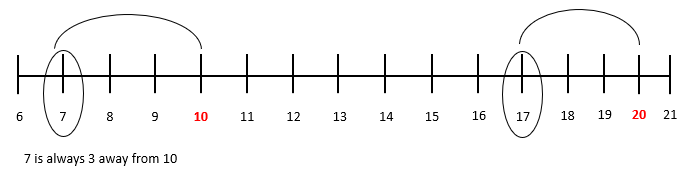
### Daily number sense: Nearest 10 – 10 minutes

1. Build student understanding of the relationship between numbers by locating their positions.
2. Display a [digital number line](https://www.didax.com/apps/number-line/) and choose a number for students to locate the nearest 10. For example, if you choose 13, students write 10 on their individual whiteboard.
3. Continue selecting numbers and ask questions such as:

* What are you noticing?
* What strategies are you using to locate the numbers?

**Note:** No number is ever more than 3 away from a landmark (or benchmark) of 5 or 10 (see Figure 2). Select numbers that suit Early Stage 1 and Stage 1 learners.

Figure 2 – Landmark numbers



### Helping the principal – 20 minutes

1. Tell students the principal asked to borrow a handful of counters, so you gave them a handful. The handful contained 43 counters. Now the principal has asked for another handful. Ask students to get another handful for the principal.
2. Each child grabs a handful of counters and records how many they grabbed on a sticky note.
3. On a large zero to 50 number line, with increments of 10 marked, plot your handful and have students place their sticky note on the number line.

**Note:** Use masking tape or chalk to draw a number line large enough for all students to plot their handful of counters.

1. Looking at the number line, ask:

* Will the principal get the same number of counters from each handful? Why or why not?
* Who has the smallest handful?
* Who has the largest handful?
* Do you think you will need to grab more handfuls to get a similar amount to me?

1. Ask students to think about how they could organise their collections so that it is easier to see how many counters they have and how to keep track of the counters they have counted. Stage 1 students collect handfuls of counters, trying to get as close to 43 as possible. Early Stage 1 students collect 25 counters from a larger collection.
2. Revise the structured ways to organise a large collection of objects by displaying photos from [Lesson 1](#_Lesson_1:_Battleship).
3. Stage 1 students grab more handfuls and structure their count. They record each time they grab a handful, so they know how many handfuls are needed. Provide Early Stage 1 students with a large collection of counters. Early Stage 1 students collect 25 counters from the larger collection and structure their count.

### Discuss and connect the mathematics – 10 minutes

1. Stage 1 students share how many handfuls they grabbed, how many lots of 10, and the total amount they collected. Figure 3 shows how the handfuls could be recorded.

Figure 3 – Organised count

An image of 4 groups of 10 counters, set out to look like a ten-frame and 1 group of 2 counters. Next to the image is some text.
How many handfuls? 6 handfuls
7 in each handful
Total - 42
I would need to give the principal 6 handfuls.

1. Go on a [gallery walk](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555) and prompt students to demonstrate their counting strategies with a focus on the success criteria.
2. Ask students:

* How did you keep track of the count?
* Did you use a counting strategy (like counting by twos) to count out the number of objects?
* How can you be sure of your total?
* How many handfuls did you need to get as close to 43 as possible?
* Which was the most efficient way to count your total? Why?

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for:   * Are students able to count out a given number of objects from a larger collection? **(MAE-RWN-01)** * Do students understand that 10 ones are the same as one 10? **(MA1-RWN-01, MA1-RWN-02)** * What strategies are students using to calculate their total? **(MAO-WM-01, MA1-FG-01)** * How are students counting objects? By ones? Twos? Tens? **(MAE-RWN-01, MAE-FG-02, MA1-RWN-01, MA1-FG-01)** * How are students organising their objects? For example, small equal groups, ones, in a line, making towers or by forming structures like ten-frames or dice patterns. **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MAE-FG-02, MA1-RWN-01, MA1-FG-01)**   What to collect:   * photos of students work presented in the [gallery walk.](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555) **(MAO-WM-01, MAE-RWN-01, MAE-RNW-02, MA1-RWN-01)** | Students do not count out a given number of objects from a larger collection.   * Support students to count objects one-to-one by physically moving the objects into different piles as they count. Ask students how many objects they have and highlight that the last number word said indicates how many objects have been counted. * Have students arrange the objects in a line and recount (noting where they have said the incorrect number). Ask students what number comes before or after the incorrect number. * Explain to students that they should keep spaces between collections to show which ones have been counted and which ones have not. Demonstrate the benefits of using spaces between collections.   Students do not use place value knowledge to rename collections of 10 ones as one 10 to help determine how many there are.   * Provide students with [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1). * Help students visualise collections of 10 by physically grouping objects in a clear cup. | Students count a large collection of objects.   * Estimate and check how many handfuls students needed to grab to reach 43 by using a number line or skip counting. * Students create their own mathematical story and solve it using their handful as the unit of measurement. |

### Consolidation and meaningful practice: Minute to win it – 20 minutes

1. Organise students into small groups with a large collection of objects in the middle. Students have one minute to collect as many objects as possible, collecting only one object at a time.
2. When the minute is up, students count their objects using a structured strategy to maintain the count and strengthen their understanding that 10 ones are the same as one 10.
3. Students share their total and the player with the largest number wins.

## Lesson 3: Place value

**Core concept:** Numbers can be partitioned in different but equivalent ways.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intention | Success criteria |
| All students are learning that the position of a digit in a number determines the value it represents. | All students can rename a one-, two- or three-digit number to understand the value of each number’s place. For example, in the number 965, 9 is 9 hundreds, 6 is 6 tens and 5 is 5 ones.  In addition, students working towards Early Stage 1 outcomes can model and compare numbers to 20.  In addition, students working towards Stage 1 outcomes can understand the role of zero. |

### Daily number sense: Make a number? – 10 minutes

1. Build student understanding of how numbers are represented by joining different representations of numbers together.
2. Display [Resource 2: Make a number](#_Resource_2:_Build). Students choose a number representation from inside the box and one from outside the box and combine them.
3. Students use their individual whiteboard to record their combinations (see Figure 4).

Figure 4 – Number representations

Title at the top of the image, What number can you make? 
Inside a box are a collection of number representations and outside the box are a different collection of number representations. In the bottom left corner is a student example, 15 is 10 and 5. 

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1. Choose students to share how they used different representations to create numbers.

### Beat the teacher – 20 minutes

1. On the board, draw 3 columns titled hundreds, tens and ones. Inform students that they need to make the largest possible three-digit number with just 3 rolls of a die. Roll a 0-9 die and have students suggest where to place the digit. Continue until you have a three-digit number.
2. Repeat the process, now playing against a Stage 1 student. Explain that the goal is to be the player that can represent the largest three-digit number. Then challenge an Early Stage 1 student to represent the largest two-digit number.
3. Give students a die and have them roll 2 or 3 times and create their largest number, working independently on whiteboards.

**Note:** Early Stage 1 students complete this activity with numbers between 0–30 unless they are confident with higher numbers. Provide a range of dice to support the creation of smaller and larger numbers, for example, 0–3, 0–6 or 0–9 dice. Use dice that have a zero as it is important for students to understand that the zero is a placeholder and does not hold a value.

1. Select students to demonstrate the number they created and the reasoning behind the placement of each digit.

**Note:** If students are unable to articulate the reason for the strategic placement of the digit, model your thinking out loud. For example, ‘I rolled a 9, this is the largest number on this die. I will place it in the hundreds column because the 9 represents 9 hundreds.’

### Build a number – 20 minutes

1. Provide pairs of Stage 1 students with [Resource 3: Build a number](#_Resource_3:_Build_1) and dice. Have partners play each other to build the largest number.
2. Stage 1 students play for 4 rounds and then change the aim to smallest number and then closest to a target number.
3. Provide Early Stage 1 students with [Resource 4: Build a two-digit number](#_Resource_3:_Build), interlocking cubes or MAB blocks, and dice. In pairs, each player rolls the die and builds the number using interlocking cubes or MAB blocks. Students record their number and compare with their partner. The player with the highest number receives a point.
4. Use [Resource 5: Build a number assessing game play](#_Resource_4:_[Interview) to prompt students whilst playing the game.

**Note:** Use a reusable plastic sleeve for the gameboard to allow students to play multiple games.

### Discuss and connect the mathematics – 10 minutes

1. Summarise the lesson together, drawing out some key mathematical ideas with students by asking:

* What strategy did you use when you were trying to build the largest/smallest/target number?
* What strategy did you use to help you represent your number using interlocking cubes or MAB blocks?
* How did you know your number was larger/smaller than your partner’s?
* What does each column represent?
* When you rolled a zero, what did you do with it? Why?

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for   * Are students able to build and compare numbers to 20? **(MAE-RWN-01, MAE-RWN-02)** * Can students rename one-, two- and three-digit numbers to show the value? **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MA1-RWN-01, MA1-RWN-02)** * Can students state the value of digits in two- and three-digit numbers? **(MA1-RWN-01, MA1-RWN-02)**   What to collect:   * student samples of [Resource 5: Build a number assessing game play](#_Resource_4:_[Interview). **(MAO-WM-01)** | Students do not build numbers to 20 with manipulatives. Use 2 of [Resource 1: Ten-frame](#_Resource_1:_Ten-frame) for students to record the number rolled using counters.  Students are unable to state the place value of three-digit numbers. Use [Resource 4: Build a two-digit number](#_Resource_3:_Build) to allow students to focus on using manipulatives to build two- and three-digit numbers. Ask questions, such as which digit is in the tens place, or what is the value of the 4 in the tens column.  Students cannot partition numbers. Use interlocking cubes to build and rename the given number. | Students state the place value of two- and three-digit numbers.   * Students use 4 dice to explore all the different four-digit combinations that can be created and round them to the nearest multiple of 1000 by playing [Round the Four Dice](https://nrich.maths.org/10426) from [NRICH](https://nrich.maths.org/teacher-primary). * Students play [Mastermind (7:43)](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources/mastermind) or [Hit it (3-digit numbers) (9:11)](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources/hit-it) which provides an opportunity to ask mathematical questions around place value. |

## Lesson 4: Busting numbers

**Core concept:** Numbers can be partitioned in many different ways.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that a collection can be partitioned (renamed) in different ways but keep the same value.  Early Stage 1 students are learning that hefting compares 2 masses directly.  Stage 1 students are learning that equal-arm balances help to show equivalence. | All students can rename and record one-, two- or three-digit numbers in different ways.  In addition, students working towards Early Stage 1 outcomes can make a model of a one- or two-digit number and heft to confirm that they are equal.  In addition, students working towards Stage 1 outcomes can use an equal-arm balance to check equivalence. |

### Daily number sense – 10 minutes

1. Identify a class need through formative assessment data and complete a short, focused activity that targets students’ knowledge, understanding and skills. Example activities may be drawn from the following resources:

* [Thinking Mathematically Stage 1](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources.main-education--category---catalogue---stage---stage-1.nameAsc.1.grid#catalogue_auto)
* [Universal Resources Hub](https://resources.education.nsw.gov.au/home)

### Number busting – 20 minutes

This lesson has been adapted from [Number busting: number talk (renaming 26) (2:00)](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources/number-busting-renaming-26) by [Thinking Mathematically](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources#catalogue_auto).

1. Sit in a circle and display 3 bundles of 10 and 6 ones. Tell students you have 36 objects. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) to share ideas on how they can prove there are 36 objects.

**Note:** Bundles of 10 can be made with craft sticks, interlocking cubes, straws or similar items that can be separated. Watch [Number busting: number talk (renaming 26) (2:00)](https://education.nsw.gov.au/teaching-and-learning/curriculum/mathematics/mathematics-curriculum-resources-k-12/mathematics-k-6-resources/number-busting-renaming-26) prior to the lesson.

1. Invite students to number bust 36. Record some of the different ways they have renamed the collections. Demonstrate ideas students may not think of, such as unbundling the collections to show 36 is 2 tens and 16 ones.
2. Heft the collections of craft sticks and then use an equal-arm balance to prove equivalence. Place 3 bundles of 10 and 6 ones on one side and 2 bundles of 10 and 16 ones on the other side. Emphasise that no more craft sticks have been added and none have been removed. This means the total size of the collection remains the same even though it looks different. Invite students to share 2 or 3 other ways of renaming 36 and check equivalence.
3. Repeat and model the above steps with students using a different number.

**Note:** Provide opportunities for Stage 1 students to bust larger two- or three-digit numbers.

### Different ways to see a number – 20 minutes

1. Provide pairs of Early Stage 1 students with interlocking cubes and Stage 1 students with an equal-arm balance and a large collection of MAB blocks.
2. Display a variety of one-, two- and three-digit numbers to rename. Students choose numbers to rename and build different representations. Students check equivalence using either hefting or an equal-arm balance.
3. Students record their working using symbols and words (see Figure 5).

Figure 5 – Student working

Two side by side images. The first image is for Stage 1. 36 is represented with 3 tens and 6 ones and also represented with 2 tens and 16 ones. Below the number 36 is written, as well as, symbols: 30 + 6 and 20 + 16 and
words: 36 is equal to 3 tens and 6 ones and 2 tens and 16 ones. The next image is titled Early Stage 1. There is a tower of 14 cubes, 10 blue and 4 purple. There is another tower of 14 cubes, 9 orange and 5 green. Below this is the number 14 and the text, 14 is 1 ten and 4 ones and 14 is 5 and 9 

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1. Students continue to rename given numbers and check that they remain the same.

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for   * Can students heft the representation of one- and two-digit numbers to check they are equal? **(MAE-NSM-01)** * Can students rename a number in relation to its parts? **(MAE-CSQ-01, MAE-CSQ-02)** * Do students understand that 10 ones are the same as one 10? **(MA1-RWN-01, MA1-RWN-02)** * Can students use an equal-arm balance to check the equivalence of a number? **(MAO-WM-01, MA1-NSM-01)** * Can students partition (rename) one-, two- and three-digit numbers to show the value? **(MAE-RWN-01, MA1-RWN-01, MA1-RWN-02)**   What to collect:   * student work samples. **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MA1-RWN-01, MA1-RWN-02)** | Students are not confident with renaming numbers.   * Use craft sticks bundled together or interlocking cubes so students can manipulate the numbers, breaking them apart and re-forming them. Explain that no more sticks are being added to the collection and none are being removed. * Students rename numbers to 10 or 20, using interlocking cubes to represent the way they have renamed the whole number. | Students are confident in two- and three-digit partitioning strategies.   * Revise that students can partition the number in 2 ways and ask if they can also partition it in 3 or 4 ways. * Students explore different ways to balance an equation using [Multiply Multiples 3](https://nrich.maths.org/10478) by [NRICH](https://nrich.maths.org/). * Students partition four-digit numbers and check equivalence. |

### Discuss and connect the mathematics – 10 minutes

1. Strategically select students to share their thinking and model different ways of renaming their collection to prove that nothing has changed.
2. As a class, record students’ thinking using symbols and words and focus on the idea that a collection can have the same value but look different. Revise that equivalence can be proved using hefting or an equal-arm balance.

## Lesson 5: Compare 2 number lines

**Core concept:** Numbers can be compared through different representations.

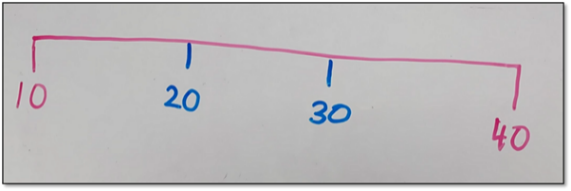
The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * number lines of the same length can represent different ranges of numbers * the position of the hour hand and minute hand represent time. | All students can:   * understand that an analog clock is made by curving a number line * locate, sequence and compare numbers on a range of number lines.   In addition, students working towards Early Stage 1 outcomes can read and communicate o’clock time using the position of the hour and minute hands.  In addition, students working towards Stage 1 outcomes can read and communicate o’clock, half- and quarter-hour time using the position of the hour and minute hands. |

### Daily number sense: Number placement – 15 minutes

1. Build student understanding of number placement by ordering given numbers.
2. On their individual whiteboards, Stage 1 students draw a blank number line within a given range.
3. Students mark multiples of 10 within that range (see Figure 6).

Figure 6 – Number placement

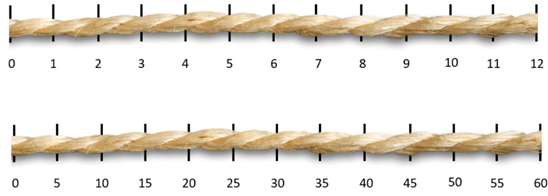


1. Provide Early Stage 1 students with a selection of numbers, for example, 19, 15, 12, 17, 6 and 21. Students order the numbers in ascending or descending order on their individual whiteboards.
2. Continue with different ranges and provide time for discussion for both Stage 1 and Early Stage 1.

### Hour and minute lines – 20 minutes

1. Students sit facing 2 long ropes, placed parallel to each other. The ropes represent 2 number lines. Early Stage 1 students place numbers zero to 12 on the top number line, attaching the numbers to the number line with tape or pegs.
2. Stage 1 students repeat this activity for the bottom number line using numbers zero to 60 (see Figure 7).

Figure 7 – Rope number lines



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**Note:** If students do not align the numbers with the parallel number line, discuss the importance of lining up the numbers. For example, if 2 on the top number line does not align with 10 on the bottom number line.

1. Have students stand and look at the 2 number lines. Discuss the connection between both lines.

The table below outlines stimulus prompts to generate conversation about the topic, along with anticipated responses from students.

|  |  |
| --- | --- |
| Prompts | Anticipated student responses |
| * Do you see any patterns between the lines? * What are some similarities? * What are some differences? * How are the lines related? | * Both lines have the same number of numbers. * One line goes up by ones. * One line goes up by fives. * The numbers are plotted with the same distance. |

1. Place the words ‘hour’ and ‘minute’ next to the corresponding number lines. Ask:

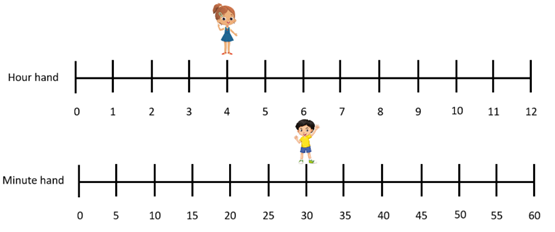
* Is there a relationship between the hour number line and the minute number line?
* Why does one number line count by fives and the other number line count by ones?

1. On a third number line, students peg [Resource 6: Hour and minute numbers](#_Resource_5:_Hour) onto the rope to represent the combination of the hour and minute number lines. Turn the rope into a circle so the numbers represent the face of a clock.
2. Discuss the connections that students make between the number lines and the representation of a clock face.

### Building time – 25 minutes

1. Choose one student to stand on the hour number line and another on the minute number line (see Figure 8) and give them a time to represent. Early Stage 1 students represent o’clock time and Stage 1 students represent o’clock, half past and quarter-to and -past using a variety of language to name the time, for example, four-thirty and half past 5.

Figure 8 – Time on the line



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1. Have the rest of the class build the time given using their clock.
2. Continue to do this for various times and choose different students to stand on the number lines. Pause to discuss the relationship between the number lines and the hour and minute hands.

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for   * Can students sequence numbers 0-12 in ascending order? **(MAE-RWN-01, MAE-RWN-02)** * Can students read o’clock and describe the position of the hands? **(MAE-NSM-02)** * Can students sequence numbers and arrange them on a number line? **(MA1-RWN-01)** * Can students read o’clock, half-hour and quarter-hour and describe the position of the hands? **(MA1-NSM-02)** * Can students connect and communicate that an analog clock is made by curving a number line? **(MAO-WM-01)**   What to collect:   * observations and student work samples. **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MA1-RWN-01, MA1-RWN-02)** | Students have difficulty sequencing numbers. Provide students with a number chart so they can see the order of numbers and use this as a reference.  Students have difficulty making the connection between the number line representation and the clock face representation.   * Students describe where the number is on the line and where the number is on the clock face. For example, 6 is halfway on the number line and halfway around the clock face. * Demonstrate how the 12 on the number line represents o’clock on the clock face.   Students are not confident counting by fives. Include markings of ones on the number line and on the clock face. | Students confidently make the connection between the number line and the clock face. Students move between the hour numbers to represent the movement of the minute hand, for example, by standing halfway between the 4 and 5 to represent 4:30. |

## Lesson 6: How many seeds?

**Core concept:** Patterns are helpful when quantifying large collections.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * familiar structures can be used to represent a large collection of objects * patterns inside of numbers help to count (quantify) collections, for example, number bonds.   Stage 1 students are learning that:   * renaming collections as tens and ones is an efficient way to quantify total amounts * familiar combinations (patterns) of numbers up to and including 10 is an efficient way to quantify total amounts. | All students can:   * confidently use familiar structures to represent a large collection of objects * use patterns inside of numbers to help count (quantify) collections.   In addition, students working towards Stage 1 outcomes can:   * describe why renaming tens and ones is more efficient * create, recall and recognise combinations (patterns) of numbers up to and including 10. |

### Daily number sense: Part-whole combinations – 10 minutes

1. Build student understanding of part-whole combinations to 10 by providing them with a target number and having students recall and record combinations.
2. Spin the [digital spinner](https://www.didax.com/apps/spinners/) to provide the target number. Students record combinations for that number on their individual whiteboard. For example, if 5 is spun, a student may write 3 and 2 or 3 + 1 + 1.
3. Select students to provide combinations for the target number and record these on the board.

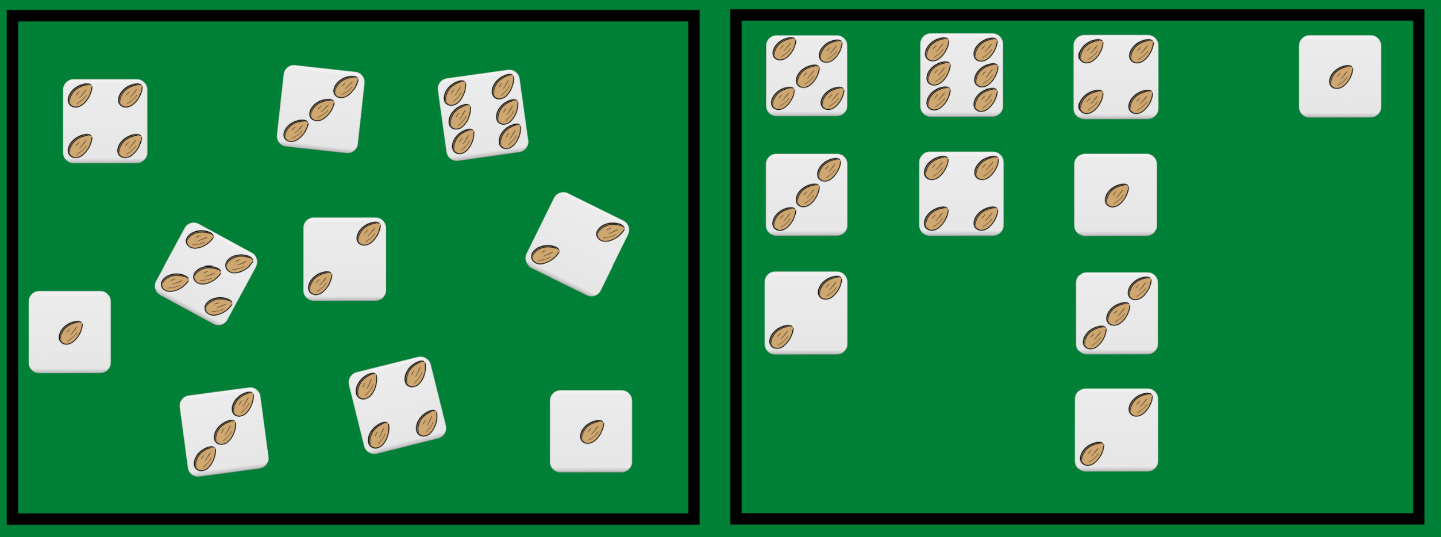
**Note:** If the same number is spun, challenge students to come up with different combinations.

### How many seeds? – 20 minutes

This lesson has been adapted from Boaler et al. (2021).

1. Display [Resource 7: How many seeds?](#_Resource_7:_How) and explain that Farmer Dave works at the seed warehouse. Each packet of seeds must have 10 seeds inside before they can be sold. He needs to sort his piles of seeds into groups of 10, but he has a lot of seed piles. He needs some help!
2. Explain that for this activity, individual counters or dots on the dice will represent the seeds.
3. Scatter a handful of 20 counters and explain that students need to find how many seeds there are in total. Ask students to discuss with a partner the ways they could organise the counters so that they can efficiently count the collection of seeds. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) about ways to organise the counters for an efficient count.
4. Students share ways of structuring the counters and the total number of seeds they counted.
5. For Stage 1, roll at least [10 dice](https://www.didax.com/apps/dice/) and for Early Stage 1, roll at least 3-4 dice. Tell students that they need to find how many seeds there are in total now. Ask students to discuss ways they could organise the dice so that they can efficiently count the collection of seeds. Looking at the dice, ask students how many dots there are in total.
6. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) about ways to organise the dice so that they can efficiently count the collection.
7. Students share ways of structuring the dice and the total number of seeds they counted.
8. Have students reflect on the efficient and effective strategies they used to count large collections of objects in [Lesson 1](#_Lesson_1:_Battleship) and [Lesson 2.](#_Lesson_2:_Counting) Ask if there was a strategy that students used to maintain the count of a large collection.
9. Roll the dice again. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) to determine the most efficient and effective way to organise and count the number of seeds (see Figure 9).

Figure 9 – Organising seeds



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1. Students share the ways they structured the counters or dice to count the total number of seeds. Choose students who have grouped the dice in different ways, for example, using similar numbers, and have them justify their strategy. If a pair has grouped by 10, use their combination to lead into the next part of the lesson.

### Consolidation and meaningful practice – 20 minutes

1. Provide small groups of Stage 1 students a collection of 10 to 20 dice and an individual whiteboard to record the total count.
2. Give small groups of Early Stage 1 students a pile of counters or 8 to 10 dice and an individual whiteboard to record the total count.
3. Students take it in turns to roll the dice or scatter a handful of counters from their pile. Students work together to organise the counters or dice to count the seeds efficiently.

**Note:** The focus for Early Stage 1 students is to create and recognise combinations up to 10.

1. As students play, ask:

* How can you organise the counters or dice to help you count?
* How many groups of 10 did you make?
* Did you use more than 2 dice to create a group of 10?
* How might groups of 10 help you count the seeds?
* What is the largest number of seeds you counted? How do you know?

**Note:** Take photographs of the ways that students organise their dice for assessment and the ‘discuss and connect’ part of the lesson.

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for:   * Can students create, recall and recognise combinations of numbers to 10? **(MAO-WM-01, MAE-CSQ-02, MA1-CSQ-01)** * Do students understand that 10 ones are the same as one 10? **(MA1-RWN-01, MA1-RWN-02)** * Can students count large sets of objects by systematically grouping in tens? **(MAO-WM-01, MA1-CSQ-01)**   What to collect:   * photos of how students have organised their dice. **(MAO-WM-01, MAE-RWN-01, MAE-RWN-02, MA1-RWN-01)** | Students are unable to count their collection using known patterns or structures.   * Students use an individual whiteboard to draw and keep track of counters or dice. * Students organise their counters or dice into groups of the same number. For example, all the fours. * Provide students with [Resource 1: Ten-frame](#_Resource_1:_Ten-frame_1) and different coloured counters to demonstrate the dots from the different dice.   Students do not use groups of 10 counters or dots to quantify and rename collections.   * Ask students to look at the collection of counters or dice and use their looking and thinking to see how many seeds there are. Ask how students could group the seeds to make them easier to count. * Ask students to tell you all they know about 10. Encourage students to use this knowledge to help them make groups. | Students organise their counters or dice using an efficient counting method.   * Using the combinations they have made, challenge students to only use 2 dice to partition to 10, or use the greatest or least number of dice to partition to 10. * Ask students how they can be sure that they have made all the combinations to 10. Have students record all combinations and a method to check their working. * Tell students that Farmer Dave is having a special sale and is making packets with 12 seeds. Students repeat the activity, using their counters or dice to make combinations of 12. |

### Discuss and connect the mathematics – 10 minutes

1. Display the pictures and summarise the lesson together by asking questions, such as:

* How did you organise your counters or dice to see how many seeds there were?
* How did your strategies change as you played?
* What patterns did you notice that helped you organise the counters or dice?
* How did organising the counters or dice help you count?
* What other ways could the counters or dice be organised?
* Is there anything that you are still wondering?

## Lesson 7: Sorting seeds

**Core concept:** Large collections can be quantified, organised and represented in different ways.

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * the same collection of objects can be represented in different ways * counting in tens and ones is more efficient. | All students can:   * use familiar structures to represent a large collection of objects * describe why counting in tens and ones is more efficient * communicate their reasoning behind counting strategies. |

### Consolidation and meaningful practice: The clock – 10 minutes

1. Build student understanding of the relationship between a number line and the face of a clock by representing the time.
2. Draw the minute and the hour number line on the board and display an [interactive clock](https://toytheater.com/clock/).
3. Choose a number from the minute number line and the hour number line and have students build the time on the interactive clock.
4. Discuss the relationship between the number lines and the hour and minute hands.

**Note:** Early Stage 1 students represent o’clock time and Stage 1 students represent o’clock, half past and quarter-to and quarter-past.

### Sorting seeds: Part 1 – 15 minutes

This lesson has been adapted from Boaler et al. (2021).

1. Show [Resource 8: Pumpkin patch problem](#_Resource_8:_Pumpkin). Explain that farmer Phil needs to plant pumpkin seeds in his vegetable garden. Unfortunately, his pumpkin seeds have been jumbled up into 4 different piles. He needs to know how many seeds are in each pile.
2. Show students a handful of seeds (or counters) and explain that counting seeds by ones would take a long time. Ask students to suggest some more efficient ways of counting the seeds. These could include using familiar groupings such as fives or tens to coordinate the count.
3. Provide each pair of students with a handful of counters. For each round of the activity, students will need a different number of counters.
4. Ask students to consider how many packets of 10 vegetable seeds they can make and how many loose ones might be left over. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) with a partner. They can use containers, ten-frames or drawings to support their count.

**Note:** Monitor for students’ use of strategies and the idea of a packet of 10 and loose seeds.

1. Students share their strategies for working out the number of seed packets they need, and loose seeds left over.

### Sorting seeds: Part 2 – 15 minutes

1. Show students [Resource 9: Packets of seeds](#_Resource_6:_Box) and explain that Farmer Phil’s manager, Farmer Fay, needs to purchase enough seeds for the next planting, but she is unsure of how many packets to order.
2. Display [Resource 10: Need for seeds](#_Resource_7:_Class) and assign pairs of students to a type of vegetable. Provide each group with the corresponding number of counters for their vegetable.

**Note:** Provide Early Stage 1 students with amounts that require less than 30 seeds. The values in [Resource 10: Need for seeds](#_Resource_7:_Class) can be edited to meet the needs of the students.

1. With their partner, students use the counters and a copy of [Resource 10: Need for seeds](#_Resource_7:_Class) to answer the following questions:

* How many full packets of seeds can you make? How many will be left over?
* Were all the packets full?
* What happens to the seeds that are left over?
* How can you check that you have the same number of seeds as the number needed by Farmer Fay?

1. Students share their strategies for working out the number of packets they will need.

**Note:** Monitor students for the use of strategies and the concepts of a pack of 10 and loose seeds.

1. Partners draw how they have packed the seeds and share with the class.

### Discuss and connect the mathematics – 20 minutes

1. Go on a [gallery walk](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555) and collect photographs of the different ways that students grouped their seeds.
2. Display the photographs and have students explain their strategies. Draw attention to the grouping of tens and hundreds, efficient strategies and patterns between the images. For example, did students draw 10 seeds or a packet with 10 on it?
3. Ask:

* How did you figure out how many packets of 10 and how many loose seeds you had?
* What did you do when you did not have a full packet?
* Did you notice any patterns as you worked?
* How are 3 groups of 10 and 8 ones the same as 38?
* How are 12 groups of 10 and 2 ones the same as 122?

This table details assessment opportunities and differentiation ideas.

|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for:   * Can students use familiar structures to represent large collections? **(MAO-WM-01, MA1-RWN-01)** * Do students understand that 10 ones are the same as one 10? **(MA1-RWN-01, MA1-RWN-02)** * Are students communicating the reasoning behind their counting strategies? **(MAO-WM-01)**   What to collect:   * Photos of students’ work from the [gallery walk](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555) and student work samples. **(MAO-WM-01, MA1-RWN-01, MA1-RWN-02)** | Students are not able to use familiar structures to represent large collections.   * Students use concrete materials, for example, interlocking cubes or counters and ten frames to represent 10 ones as one 10. * Support students to represent the numbers of seed packets needed for each type of vegetable. * Help students to translate their concrete representation into a drawing. | Students are able use familiar structures to represent large collections.   * Ask students what this would look like as a mathematical drawing and how they would structure their drawing, so they do not rely on counting. * Edit [Resource 10: Need for seeds](#_Resource_7:_Class) with new number of seeds and have students consolidate their knowledge by repeating steps 12 and 13. * Explain that the seed company is changing their packaging and are now only selling packets of 8 seeds. Ask how many packets of seeds Farmer Fay would need for each type of vegetable. |

## Lesson 8: Position on a grid

**Core concept:** There are patterns to the way numbers are formed

The table below contains suggested learning intentions and success criteria. These are best co-constructed with students.

|  |  |
| --- | --- |
| Learning intentions | Success criteria |
| All students are learning that:   * each decade has a repeating pattern of zero to 9 * grid structures help to describe locations and the paths between them. | All students can:   * identify the repeating pattern of zero to 9, for example, (10, 11, 12...19, 20, 21, 22...29, 30, 31, 32...39). * describe the movement of an object using the words up and down.   In addition, students working towards Stage 1 outcomes can:   * describe a path and give directions from one location to another * count forwards and backwards by ones and tens, on and off the decade. |

### Daily number sense: Number chart rounding – 10 minutes

1. Build student understanding of locating the nearest 10 to a number by using a number chart.
2. Display a [number chart](https://www.didax.com/apps/120-board/). Say a number and have students locate the nearest 10. For example, if you choose 57, the students would say 60.
3. Continue selecting numbers and ask questions such as:

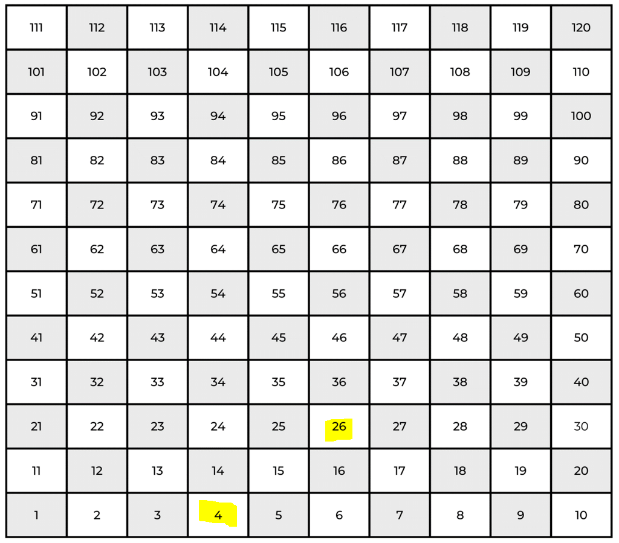
* How do we know it is closer to 60?
* Do you see any patterns?
* What happens when you land on 5?

**Note:** Students in Early Stage 1 complete this activity with numbers zero to 30.

### Difference between numbers – 15 minutes

1. Display [Resource 11: Number chart](#_Resource_8:_Number) and colour 2 different numbers. Students [turn and talk](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/numeracy/talk-moves) about how they could describe the difference between the position of the numbers (see Figure 10).

Figure 10 – Position of numbers



**Note:** Students in Early Stage 1 compete activity with numbers between 0–30, Stage 1 students complete with numbers 0–120.

1. After the discussion, select students to share how they described the difference between the position of the numbers.
2. Based on the responses, model your thinking about how to explain the position of the numbers using the grid structure. For example, ‘Starting at 4, every time I move up one square, I add 10. This means because I moved up 2 squares, I moved up 2 tens. I then moved right 2 squares and added 2 ones.’ This describes the difference in the position between the numbers 14 and 46 as being 3 tens and 2 ones. Repeat this to model subtraction of tens and ones by starting at 46.
3. Continue selecting different numbers providing opportunities to demonstrate adding and subtracting tens and ones. Choose students to model how to describe the difference in the position of the 2 numbers.

### Snakes and ladders – 25 minutes

1. Provide Stage 1 students with [Resource 12: Stage 1 snakes and ladders](#_Resource_9:_Stage) and Early Stage 1 students with [Resource 13: Early Stage 1 snakes and ladders](#_Resource_10:_Early) to practise describing the difference in position between 2 numbers.
2. Students roll a 6-sided die and move the number of places shown on the die, going up any ladders and down any snakes that they land on.

**Note:** Draw attention to the numbers on the gameboards as each row goes from left to right to show the repeating pattern.

1. When Stage 1 students go up a ladder, they need to record the difference in the position between the 2 numbers on their whiteboard, for example, add 3 tens and 4 ones.
2. When Stage 1 students go down a snake, they need to record the difference in the position between 2 numbers, for example, subtract 4 tens and 2 ones.
3. When Early Stage 1 students go up a ladder or down a snake, they say that their number has increased (up) or decreased (down). For example, I went up a ladder and my number increased from 8 to 23. Students then record the number they have moved to on a whiteboard.

This table details assessment opportunities and differentiation ideas.

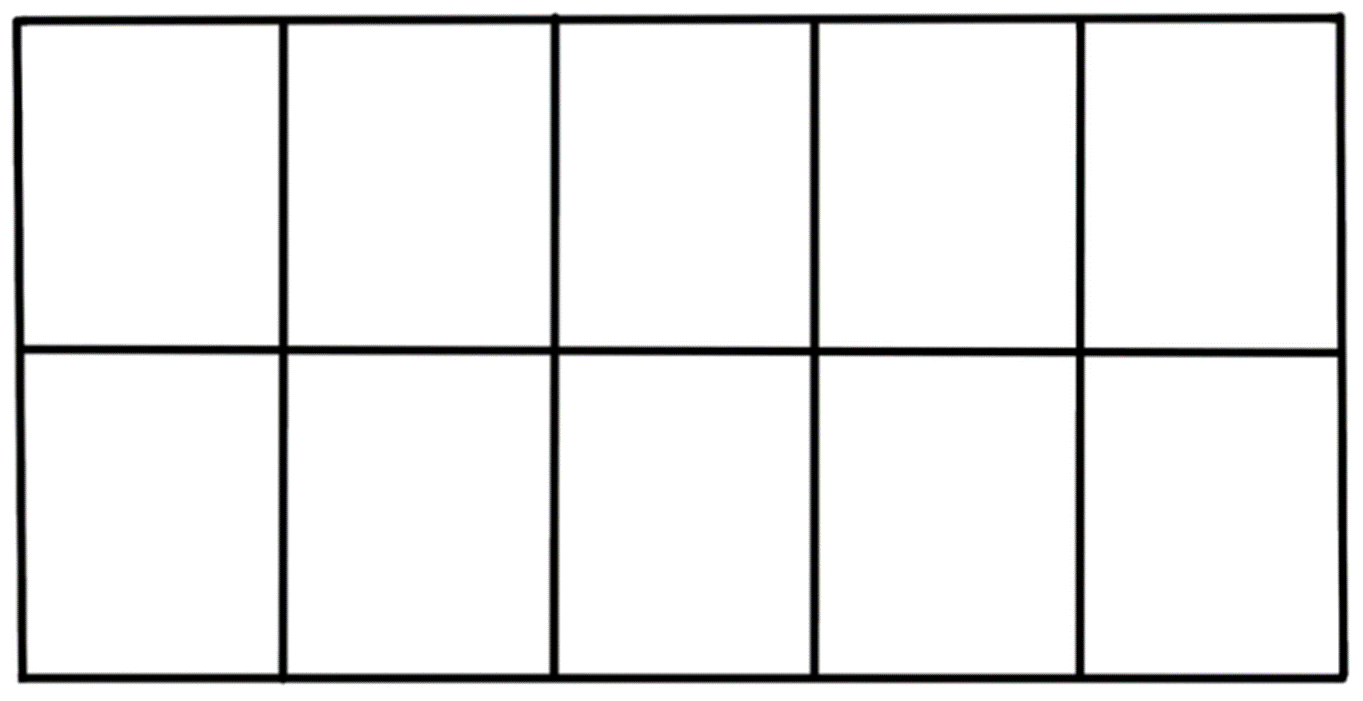
|  |  |  |
| --- | --- | --- |
| Assessment opportunities | Too hard? | Too easy? |
| What to look for   * Can students describe the movement of an object from one location to another using the words up and down? **(MAE-GM-01)** * Can students identify a number as being larger or smaller? **(MAE-RWN-01)** * Can students count forwards and backwards by ones and tens, on and off the decade? **(MA1-RWN-01, MA1-RWN-02)** * Can students use a grid system to describe a path from one location to another? **(MA1-GM-01)** * Can students give directions involving left and right turns to move between numbers? **(MA1-GM-01)** | Students do not find the difference between numbers.   * Support students to identify vertical and horizontal number patterns on the game board. * Model to students going up the 75–105 ladder and demonstrate the increasing count. * Model going down the 37–15 snake and demonstrate the decreasing count.   Students are developing knowledge of numbers above 30.   * Provide students with [Resource 14: 0-30 snakes and ladders](#_Resource_11:_0-30). * Student use [Resource 11 – Early Stage 1 snakes and ladders](#_Resource_10:_Early) and finish game play at 30. | Students can explain the difference between numbers. Students explore a hundreds chart and use a code to put it back together using [Coded Hundred Square](https://nrich.maths.org/6554) from [NRICH](https://nrich.maths.org/teacher-primary). |

### Discuss and connect the mathematics – 10 minutes

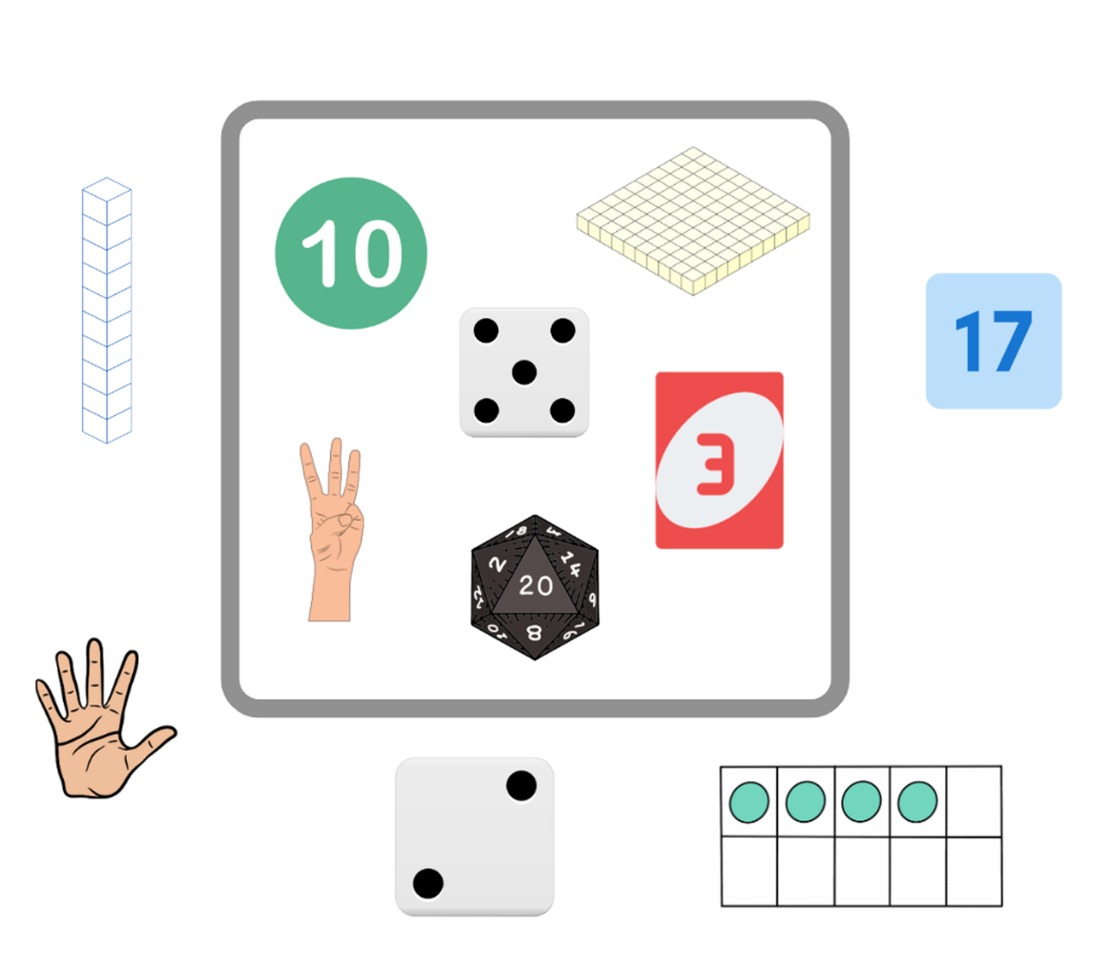
1. Summarise the lesson together, drawing out some key mathematical ideas with students by asking questions, such as:

* How does the grid structure help when describing the path between numbers?
* How did you know when your number increased or decreased?
* What strategies did you use when describing your path?

## Resource 1: Ten-frame



## Resource 2: Make a number



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## Resource 3: Build a number

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Player 1** | | | | **Player 2** | | | |
| **Hundreds** | **Tens** | **Ones** | **Number** | **Hundreds** | **Tens** | **Ones** | **Number** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
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## Resource 4: Build a two-digit number

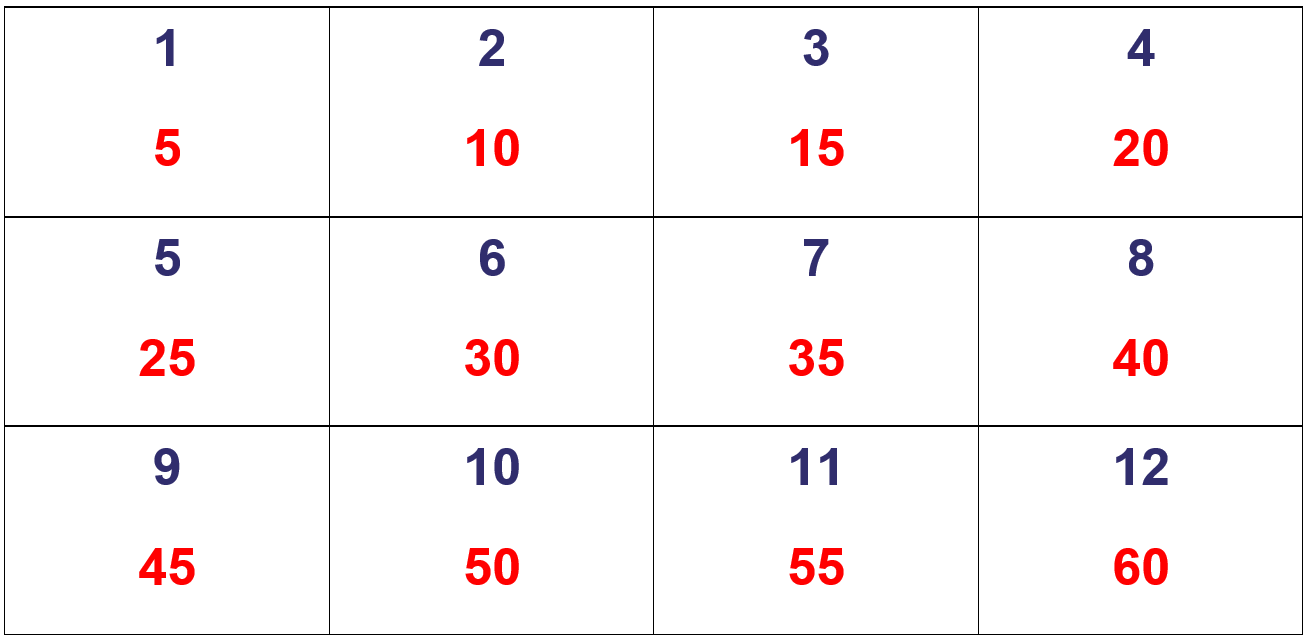
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Player 1** | | | **Player 2** | | |
| **Tens** | **Ones** | **Number** | **Tens** | **Ones** | **Number** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

## Resource 5: Build a number assessing game play

|  |  |  |
| --- | --- | --- |
| Focus | Listen, watch, and think | Ask |
| Accuracy | Are they getting correct answers? | * What answer did you get? |
| Efficiency and strategy selection | Are they applying the strategy in a reasonable timeframe?  Do they seem to be labouring or a little stuck? | * How did you solve it? * Was there a more efficient strategy you could have used or was this strategy most efficient? |
| Flexibility and strategy selection | Are they using different strategies?  Can they apply them with the same confidence? | * Why did you pick that strategy? * Is there another strategy that you could use for that problem? * When do you like to use \_\_\_ strategy instead of \_\_\_ strategy? |

Adapted from Bay-Williams J and Kling G (2019).

## Resource 6: Hour and minute numbers



## Resource 7: How many seeds?



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## Resource 8: Pumpkin patch problem

|  |  |  |  |
| --- | --- | --- | --- |
| **Piles** | **How many packets of 10?** | **How many loose seeds?** | **Total number of seeds?** |
| Pile 1 |  |  |  |
| Pile 2 |  |  |  |
| Pile 3 |  |  |  |
| Pile 4 |  |  |  |



“Farmer” by rafyfane sourced from [Canva](https://www.canva.com/) and used in accordance with the [Canva Content License](https://www.canva.com/policies/content-license-agreement/) Agreement.

## Resource 9: Packets of seeds

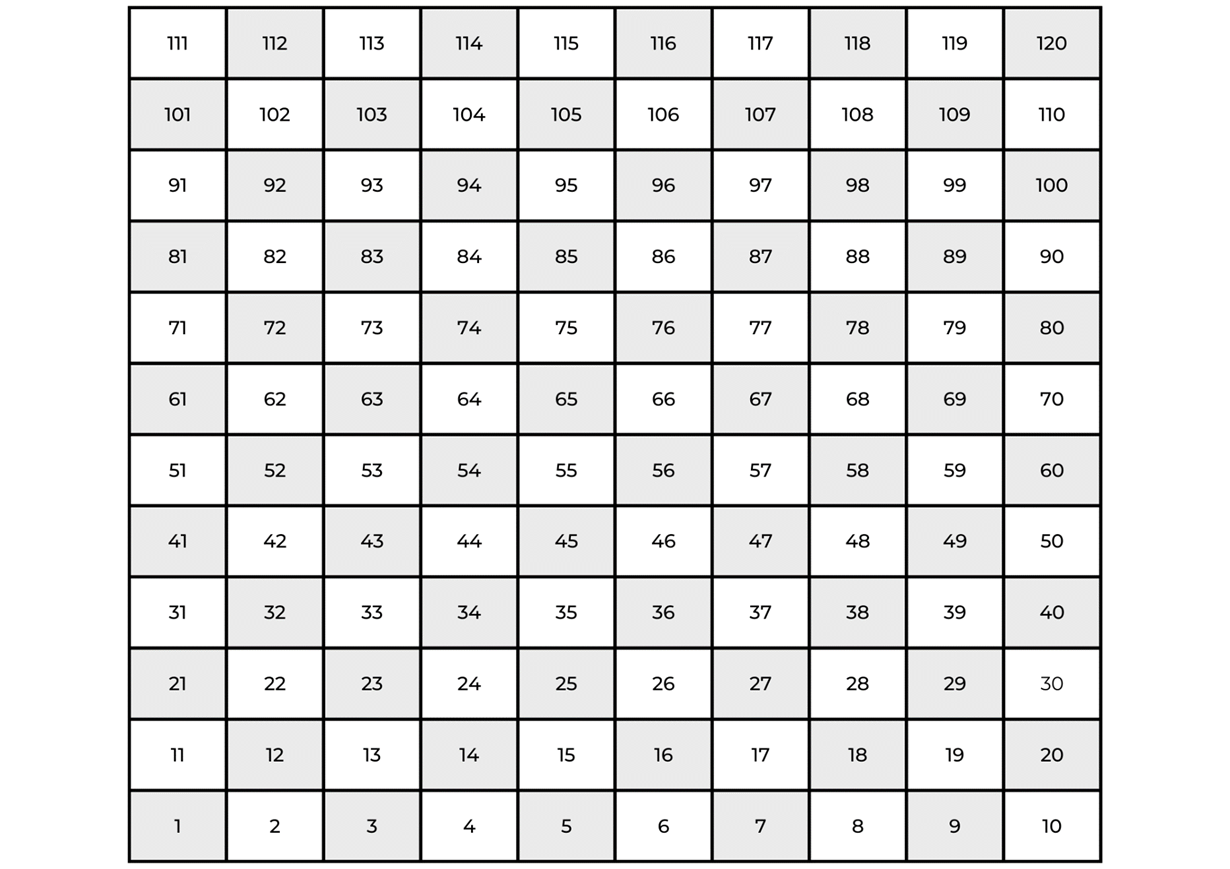


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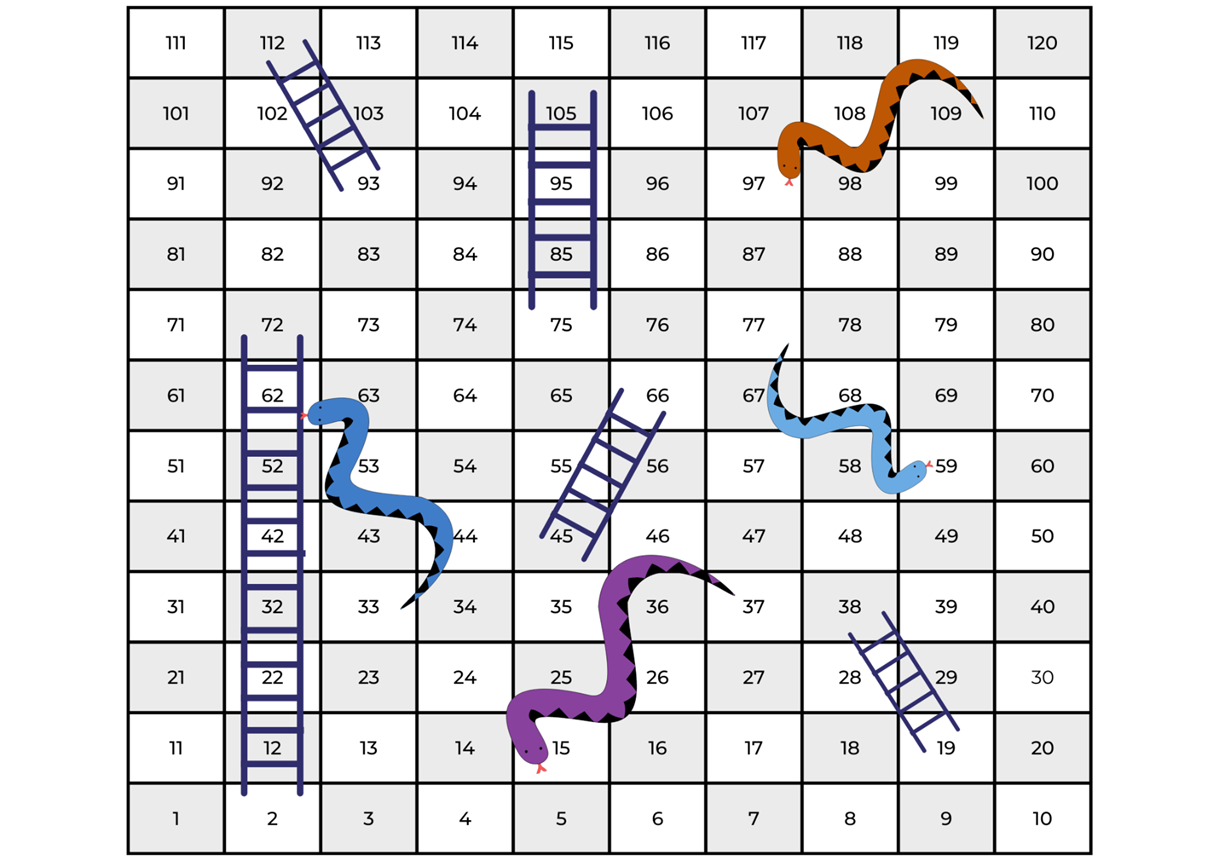
## Resource 10: Need for seeds

|  |  |
| --- | --- |
| **Garden bed** | **Number of seeds** |
| pumpkins | 15 |
| corn | 23 |
| broccoli | 26 |
| tomatoes | 38 |
| carrots | 64 |
| beans | 167 |
| capsicum | 122 |
| snow peas | 189 |

## Resource 11: Number chart

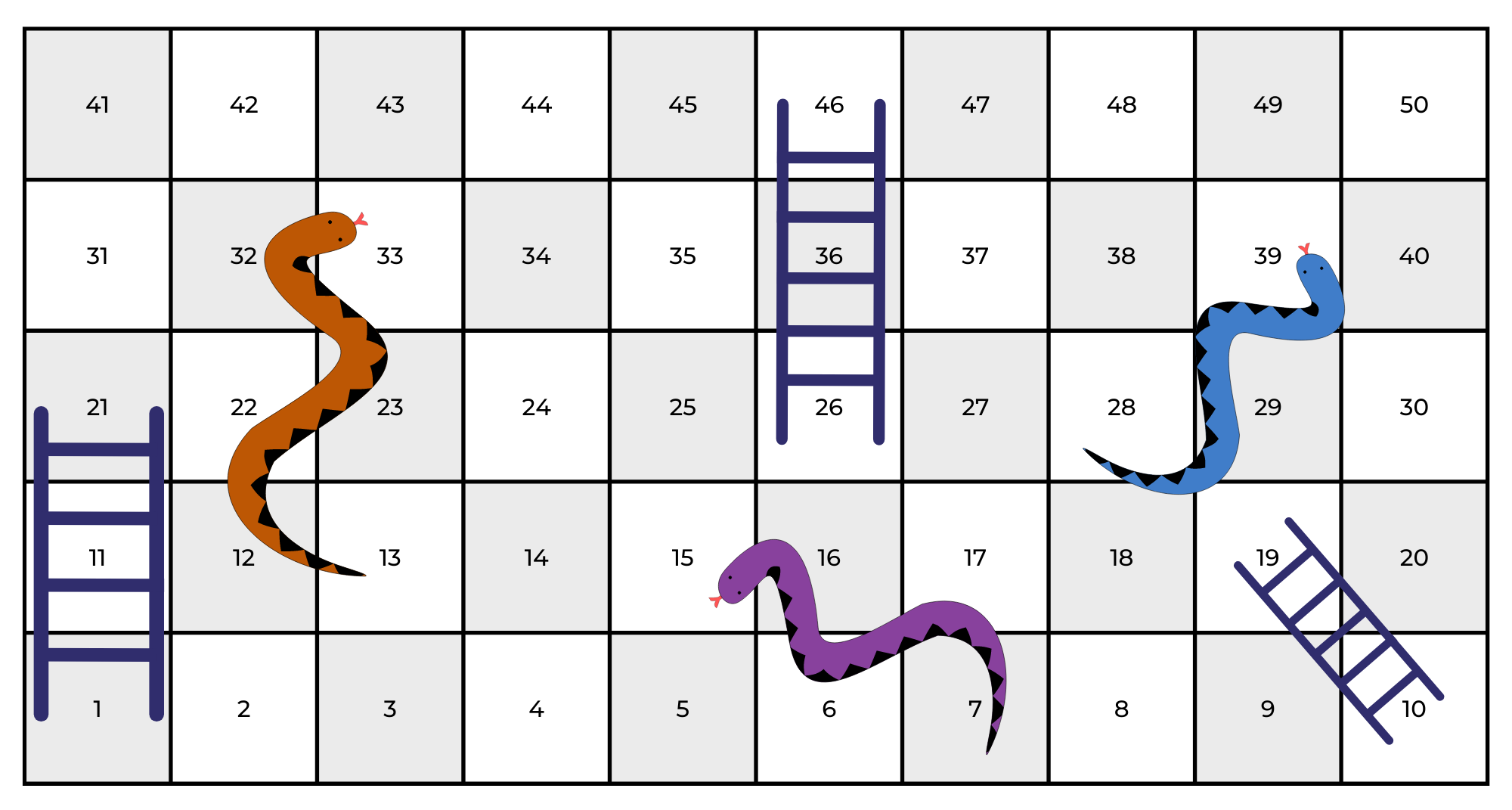


## Resource 12: Stage 1 snakes and ladders



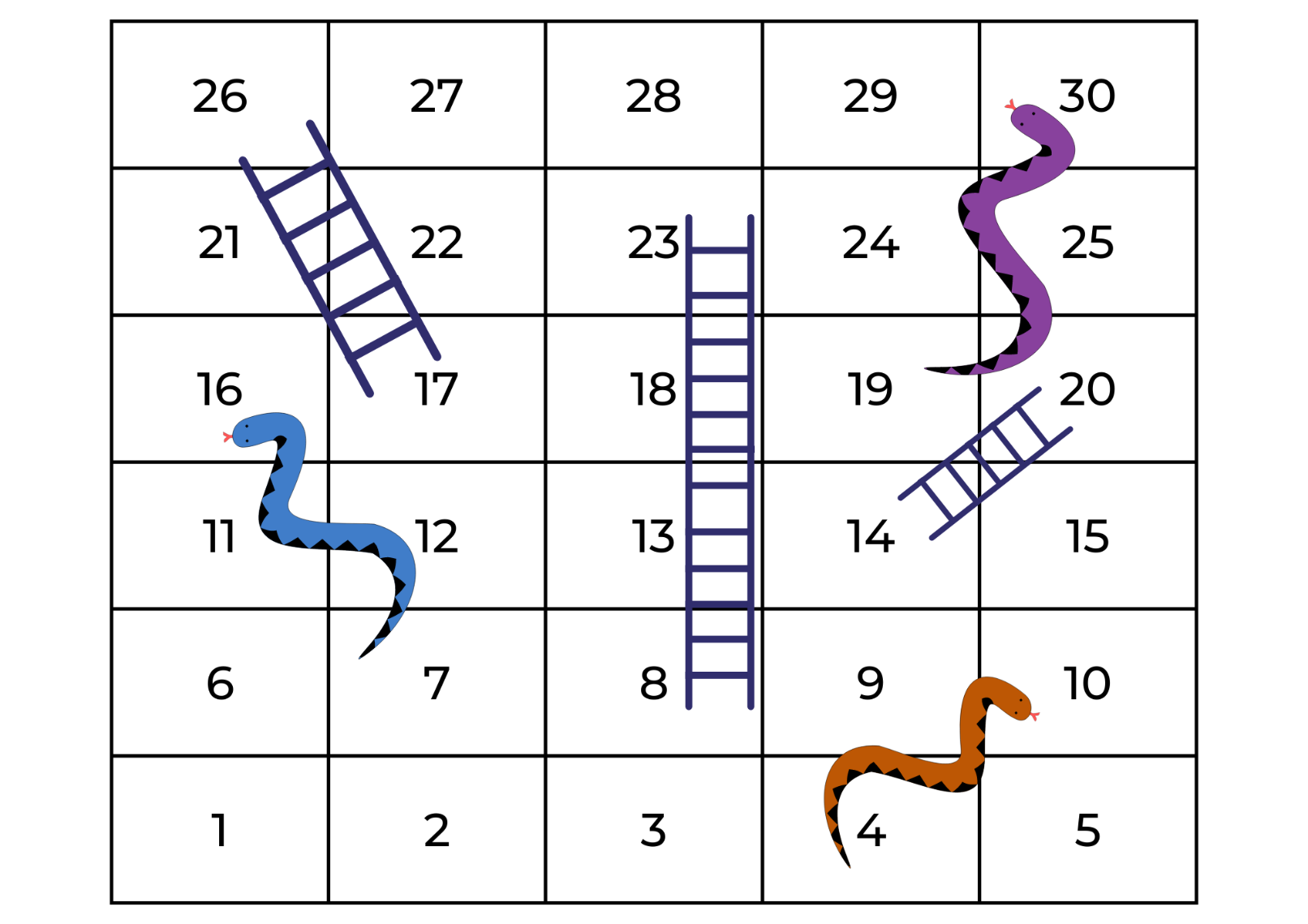
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## Resource 13: Early Stage 1 snakes and ladders



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## Resource 14: 0-30 snakes and ladders



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## Syllabus outcomes and content

The table below outlines the [syllabus outcomes](https://curriculum.nsw.edu.au/learning-areas/mathematics/mathematics-k-10) and range of relevant syllabus content covered in this unit. Content is linked to [National Numeracy Learning Progression](https://www.australiancurriculum.edu.au/resources/national-literacy-and-numeracy-learning-progressions/version-3-of-national-literacy-and-numeracy-learning-progressions/) version (3).

|  |  |  |
| --- | --- | --- |
| Focus area and outcomes | Content groups and content points | Lessons |
| **Representing whole numbers**  **MAO-WM-01**  **MAE-RWN-01, MA1-RWN-01**  **MAE-RWN-02, MA1-RWN-02** | **Early Stage 1**  **Use the counting sequence of ones flexibly**   * count forwards to at least 30 and state the number after or before a given number, without needing to count from one (CPr4) * identify the number before as 'one less' and the number after as 'one more’ than a given number | **1, 2, 5, 7, 8** |
| **Representing whole numbers (cont)** | **Early Stage 1**  **Recognise number patterns**   * recognise dice and domino dot patterns (NPA1, NPV2, CPr2) | **6** |
| **Representing whole numbers (cont)** | **Early Stage 1**  **Connect counting and numerals to quantities**   * count with one-to-one correspondence, recognising that the last number name represents the total number in the collection (CPr3, CPr5) * count out a specified number of objects (from 5 to 20) from a larger collection, keeping track of the count (CPr4-CPr5) * read numerals to at least 20, including zero (NPV3) * represent numbers as quantities to at least 20 using objects (such as fingers), number words and numerals (NPV2-NPV4, CPr3) * compare and order numbers to 20 (NPV2-NPV3) * use the term ‘is the same as’ to express equality of groups (CPr4-CPr5, MuS1) | **1–8** |
| **Representing whole numbers A** | **Stage 1**  **Use counting sequences of ones with two-digit numbers and beyond**   * identify the number before and after a given two-digit number (CPr5) * count forwards and backwards by ones from a given number to at least 120 (CPr6) | **1, 6–8** |
| **Representing whole numbers A (cont)** | **Stage 1**  **Represent numbers on a line**   * sequence numbers and arrange them on a line by considering the order and size of those numbers (CPr5) | **5** |
| **Representing whole numbers A (cont)** | **Stage 1**  **Represent the structure of groups of ten in whole numbers**   * recognise that ten ones is the same as one ten (NPV2, NPV4) * count large sets of objects by systematically grouping in tens (CPr7) * partition two-digit numbers to show quantity values (NPV4) * use number lines and number charts to assist with locating the nearest ten to a number | **1–8** |
| **Representing whole numbers B** | **Stage 1**  **Use counting sequences of ones and tens flexibly**   * count forwards and backwards by tens, on and off the decade, with two- and three-digit numbers (CPr7) | **1, 6, 7** |
| **Representing whole numbers B (cont)** | **Stage 1**  **Form, regroup and rename three-digit numbers**   * state the quantity value of digits in numbers of up to three digits (NPV5) * use place value to partition and rename three-digit numbers in different ways (NPV5) | **2, 3, 4** |
| **Combining and separating quantities**  **MAO-WM-01**  **MAE-CSQ-01, MA1-CSQ-01**  **MAE-CSQ-02**  **NOTE – there is only one combining and separating quantities outcome for Stage 1.** | **Early Stage 1**  **Model additive relations and compare quantities**   * combine two or more groups of objects to model addition, identifying the relationship between the parts and the whole (AdS1-AdS2) | **4** |
| **Combining and separating quantities (cont)** | **Early Stage 1**  **Identify part–whole relationships in numbers up to 10**   * use visual representations of numbers to assist with combining and separating quantities, identifying the relationship between the quantities (NPV2, NPA2, AdS2-AdS3) * create, model and recognise combinations for numbers up to ten (AdS2) | **4, 6** |
| **Combining and separating quantities A** | **Stage 1**  **Recognise and recall number bonds up to ten**   * recognise, recall and record combinations of two numbers that add up or bond to form 10 (AdS2, AdS6) * create, recall and recognise combinations of two numbers that add up to numbers less than 10 (AdS2, AdS6) | **6** |
| **Combining and separating quantities A (cont)** | **Stage 1**  **Use flexible strategies to solve addition and subtraction problems**   * represent addition and subtraction using structured materials such as a bead string or similar (AdS6-AdS7) | **2, 3, 4** |
| **Combining and separating quantities A (cont)** | **Stage 1**  **Represent equality**   * model the commutative property for addition and apply it to aid the recall of addition facts (AdS7) | **4** |
| **Forming groups**  **MAO-WM-01**  **MAE-FG-01, MA1-FG-01**  **MAE-FG-02**  **NOTE – there is only one forming groups outcome for Stage 1.** | **Early Stage 1**  **Investigate and form equal groups by sharing**   * group and share concrete materials by distributing objects one by one or using another method (MuS1-MuS2) | **1, 2** |
| **Forming groups (cont)** | **Early Stage 1**  **Record grouping and sharing**   * label the number of objects in a group * record grouping and sharing using drawings, words and numerals, and explain their thinking (MuS2) | **7** |
| **Forming groups A** | **Stage 1**  **Count in multiples using rhythmic and skip counting**   * count by twos, threes, fives and tens using rhythmic counting and skip counting (MuS2, CPr6) | **1, 2, 7** |
| **Geometric measure**  **MAO-WM-01**  **MAE-GM-01, MA1-GM-01**  **MAE-GM-02, MA1-GM-02**  **MAE-GM-03, MA1-GM-03** | **Early Stage 1**  **Position: Describe position and movement of oneself**   * describe the position of an object in relation to another object, such as *in, on, under* as well as the directions *up* and *down* (PoL1) | **8** |
| **Geometric measure A** | **Stage 1**  **Position: Follow directions to familiar locations**   * give and follow directions, including direction involving turns to the left and right, to move between familiar locations (PoL2) * give and follow instructions to position objects in model drawings (PoL2) * describe the path from one location to another on drawings and diagrams | **8** |
| **Non-spatial measure**  **MAO-WM-01**  **MAE-NSM-01, MA1-NSM-01**  **MAE-NSM-02, MA1-NSM-02** | **Early Stage 1**  **Mass: Identify and compare mass using weight**   * compare two masses directly by hefting (UuM3) | **4** |
| **Non-spatial measure (cont)** | **Early Stage 1**  **Time: Tell time on the hour on analog and digital clocks**   * create the layout of an analog clock (MeT2) * read analog and digital clocks to the hour using the term ‘o'clock’ (MeT2-MeT3) * describe the position of the hour and minute hands on an analog clock when reading hour time (MeT2) | **5** |
| **Non-spatial measure A** | **Stage 1**  **Mass: Investigate mass using an equal-arm balance**   * place objects on either side of an equal-arm balance to obtain a level balance * use a balance to find two collections of objects that have the same mass (UuM2) | **4** |
| **Non-spatial measure A (cont)** | **Stage 1**  **Time: Tell time to the half-hour**   * read analog clocks to the half-hour using the terms ‘o’clock’ and ‘half past’ (MeT2) * describe the position of the hands on a clock for the half-hour (MeT2) | **5** |
| **Non-spatial measure B** | **Stage 1**  **Time: Tell time to the quarter-hour using the language of ‘past’ and ‘to’**   * read analog clocks to the quarter-hour using the terms ‘past’ and ‘to’ (MeT2) * describe the position of the hands on a clock for quarter past and quarter to and relate this to quarter turns | **5** |

## References

**Links to third-party material and websites**

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### Further reading

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