Maths and Me: 2nd Class – Short-Term Plan, Unit 11: Patterns (February: Week 2)

Strand(s) > Strand Unit(s)	Algebra > Pattern, Rules and Relationships; Expressions and Equations.
Learning Outcome(s)	Through appropriately playful and engaging learning experiences children should be able to identify and express relationships in patterns, including growing or shrinking shape patterns and number sequences; interpret the meaning of symbols or pictures in number sentences.

Lesson	Focus of Learning (with Elements)	CM	Learning Experiences	Assessment
1	**All Types of Patterns:** Articulates and shares prior understanding of what constitutes a pattern (U&C); Uses available resources to create own patterns (C)		(D) Notice & Wonder L1 (D) Think-Pair-Share L1–4 (D) (C) Reason & Respond L1–3 (C) Creating Patterns L1 (D) (C) Write-Hide-Show L2–4 (C) Choral Counting L4 (D) Concept Cartoon L4 **Print resources** Pupil's Book pages 71–73 Home/School Links Book page 26 PCM 37	**Intuitive Assessment:** responding to emerging misconceptions **Planned Interactions:** responding to insights gleaned from children's responses to learning experiences **Assessment Events:** information gathered from completion of the unit assessment in the Progress Assessment Booklet page 21
2	**Repeating Patterns:** Identifies and describes repeating patterns, including the 'core' (U&C); Copies, extends, creates and translates repeating patterns of increasing complexity (U&C); Uses the 'core' to complete/extend the pattern, and to make generalisations in order to find a given term (R)			
3	**Growing or Shrinking Patterns:** Describes quantitative change in growing or shrinking patterns (C); Applies the rules that govern growing or shrinking patterns to extend to next terms, and to predict future values (R); Investigates and applies a function to a sequence of numbers (e.g. add 2) (A&PS)			
4	**Patterns in Odd or Even Numbers:** Building on examples of numbers below 100, generalises number rules (e.g. even numbers end in 0, 2, 4, 6 or 8, no matter how big the number is) (R); Recognises and describes patterns that emerge in the addition and subtraction of odd/even numbers (C); Explores and records a broad range of patterns in a hundred square (U&C)			
5	**Review and Reflect:** Reviews and reflects on learning (U&C)			

Key: Elements: (U&C) Understanding and Connecting; (C) Communicating; (R) Reasoning; (A&PS) Applying and Problem-Solving. **CM: Cuntas Míosúil:** please tick when you have completed the focus of learning. **Learning Experiences:** (C) concrete activity; (D) digital activity; (P) activity based on printed materials, followed by lesson numbers.

Additional information for planning

Progression Continua	See '2nd Class *Maths and Me* Progression Continua Overview' for a detailed breakdown of how all progression continua are covered.
Maths Language	See '2nd Class *Maths and Me* Language Overview', individual lesson plans and Unit 11 Maths Language Cards.
Equipment	See '2nd Class *Maths and Me* Equipment Overview' and individual lesson plans.
Inclusive Practices	• See Let's Strengthen and Let's Deepen suggestions throughout lesson plans. • See Unit 11 Let's Strengthen Suggestions for Teachers PCM. (These address the Common Misconceptions and Difficulties listed below.) • See Unit 11 Let's Strengthen PCM. • See Unit 11 Let's Deepen PCM.
Integration	See individual lesson plans.

Background and rationale

- This unit continues the overarching theme from Measuring 1 of The School Garden. In this way, the children can come to appreciate the wealth of patterns that are evident in both the natural and human-made environments around them.
- The unit facilitates the review and consolidation of various concepts from Number and Shape.
- Key ideas about patterns: A pattern is a sequence of shapes, colours, numbers or any items that are arranged in a specific way (i.e. not random). Patterns are visible all around us, and especially throughout maths. Patterns can repeat (i.e. repeating patterns) or they can change in a consistent way (i.e. growing or shrinking patterns).
- Repeating patterns are repetitions of symbols, shapes, numbers, etc. that can be extended in both directions and are cyclical in nature. They should have a clearly identifiable core (i.e. the shortest unit that repeats, made up of a number of elements). Letters can be used to label the core of a pattern, for example: AB AB AB (a core of two elements); AAB AAB AAB (a core of three elements), etc. Children can usually copy patterns without even recognising or identifying the core. However, to become competent in accurately extending repeating patterns, it is vital to identify the core. Some of the ways in which children become more adept at this include verbalising the pattern aloud ('red, blue, red, blue ...') and using concrete materials to model the pattern. In this way, it is easier to identify the core of the pattern by breaking it apart and laying it alongside the subsequent parts of the pattern to ensure that they match. It is difficult to identify the core of a repeating pattern from a small section of it; therefore, the core should be repeated at least twice. To encourage the children to begin to see the relationship between each term and its position, present repeating patterns with their numerical term positions.
- Growing/shrinking patterns (also referred to as increasing/decreasing sequences) are more linear in nature. They tend to increase or decrease in specific ways. The way in which the terms are ordered is governed by a rule. To help the children identify the rule, prompt the children to examine each given term and identify what has happened between it and the next term (i.e. whether the numbers increased or decreased, and by how much). They then write this (e.g. +2, –10) below and between the terms. Even when extending sequences in their copy, tell the children to leave an empty line below to allow room for writing in the differences between the terms.

The theme of this unit is **The School Garden**.

Supporting the learning of patterns, rules and relationships throughout the year

- Patterns are visible all around us, and especially throughout maths. Exploring, identifying and analysing patterns is a skill that should be incorporated regularly. As well as a dedicated one-week unit for Pattern in *Maths and Me*, throughout the other units the children are frequently prompted to explore and identify the patterns and relationships evident in a rich and varied range of mathematical situations. In addition, teachers can further strengthen and reinforce the children's understanding of Pattern by utilising every opportunity throughout the school year to develop this concept, including incorporating pattern work as a regular activity (e.g. during station teaching and morning activities), and prompting the children to always look for patterns in maths and to use these to help them solve problems and tasks.
- Ensure the children can explore and identify patterns and relationships across all subjects and curricular areas (not just maths). Regularly ask the children to predict what will happen next, since to do so requires uncovering the pattern(s) of what is happening or has happened.
- In addition to the suggestions below, see also the Optional Consolidation and Extension Possibilities section in the individual lessons.

In all subjects, ask the children:

- Do you notice any pattern(s)? Describe the pattern.
- What is staying the same?
- What is changing?
- What comes next?

Enable the children to look for patterns (and to predict what comes next) in the following subjects and areas:

- Language: rhyming patterns in poems and rhymes; spelling patterns within words; sequencing events in stories and fairy tales; patrúin san fhéilire, laethanta na seachtaine, etc.
- History: continuity and change; what has stayed the same and what has changed.
- Geography: patterns in weather; patterns in the both the built and natural features of the local environment.
- Science: patterns in nature, flowers, leaves, minibeasts, etc; the cyclical nature of life cycles in plants and animals.
- Music: melodic, lyrical and rhythmic patterns in music; repeated sections (e.g. verse, chorus, verse); action and clapping songs.
- Visual Arts: patterns in print, drawings and illustrations, fabric and fibre.
- PE: games, dance and gymnastics.
- SPHE: patterns of growth and development.
- Classroom activities and daily routines.
- Anything visible in the children's environment (e.g. clothing, textiles, materials).

Where appropriate, ask the children to represent the pattern(s) they uncovered, using concrete manipulatives and/or drawings or symbols.

In maths, enable the children to look for patterns (and to predict what comes next):

- Number: patterns on the number line, 100 square and in sequences of whole numbers and fractions (e.g. choral counting, *What patterns do you notice and what comes next?*); patterns in various regular arrangements (dot patterns, dominoes, frames and dice), and using these to subitise 'how many' without having to count; using patterns and properties to derive unknown number facts from known facts; patterns emerging from the addition and subtraction of odd/even numbers; patterns and numerical relationships in number bonds.
- Shape: patterns using 2-D and 3-D shapes; tessellating patterns using pattern blocks; predicting how a shape will look when you turn/flip/slide it.

- Measures: patterns on the calendar; repeating patterns in units of time (e.g. minutes, hours, days of the week, months, seasons).
- Data: analysing patterns that emerge, and predicting trends, outcomes and likely responses.
- Problems and tasks: uncovering patterns, and seeing how these patterns might help with solving the task.

After Unit 11, in which the children have heard and/or have used the language 'repeating', 'core', 'growing' and 'shrinking', ask:

- Do you notice any pattern(s)?
- Is it a repeating pattern?
- (If yes) How is it repeating? What is the core?
- Is it a growing or shrinking pattern?
- How is it changing each time?

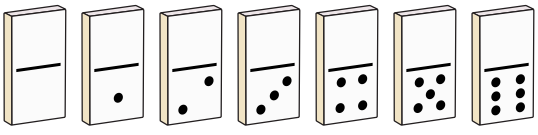
Common misconceptions and difficulties

- The children may struggle to describe patterns, or to identify the core of repeating patterns, particularly when an element is repeated within the core (e.g. ABCB pattern). (Identifying the pattern core is an important skill that enables children to not only describe the pattern, but to make generalisations and find missing terms.)
- The children may fail to look at enough of the pattern in order to determine the core (repeating part) and the missing elements.
- They may incorrectly assume that repeating patterns can be continued from only one end, whereas they can be extended in both directions.
- They may struggle to identify the rule of growing/shrinking patterns.
- They may not be secure in their understanding of other concepts that could have a knock-on effect here (e.g. names of shapes, describing or visualising rotations).

The Unit 11 Let's Strengthen Suggestions for Teachers address the common misconceptions and difficulties listed above.

Mathematical models and representations

- Representations of classroom-based resources, which could be used to create various patterns, e.g. pegs and pegboards, beads, dominoes, links, attribute bears, pattern blocks, 2-D and 3-D shapes, buttons, and objects from nature
- Representations of patterns from the real world
- Number lines
- 100 squares
- Number shapes



Dominoes

Repeating patterns

Teaching tip

The following manipulative printables are available to support this unit: Open Number Line, Base Ten Blocks, 100 Square and Dominoes. Click on the resources icon on the *Maths and Me* book cover on **edcolearning.ie**

Day 1, Lesson 1

All Types of Patterns

Focus of learning (with Elements)

- Articulates and shares prior understanding of what constitutes a pattern (U&C)
- Uses available resources to create own patterns (C)

Learning experiences

- (D) Digital activity: Patterns in the Garden
  MAM **Routines: Notice & Wonder, with Think-Pair-Share; Reason & Respond**
- (C) Concrete activity: Creating Patterns

Equipment

- Interlocking cubes, counters, any other available classroom resources that could be used to create patterns, such as pegs and pegboards, beads, dominoes, links, attribute bears, pattern blocks, 2-D and 3-D shapes, buttons, and objects from nature

Maths language

- patterns, repeating, growing (increasing), shrinking (decreasing), symmetrical

Warm-up

(D) **Digital activity: Patterns in the Garden**
MAM **Routines: Notice & Wonder, with Think-Pair-Share**

Display the poster and, using Think-Pair-Share, ask:

- What do you notice?
- What do you wonder?

Record the children's responses to both questions on the board. Allow the children the opportunity to respond to (agree/disagree with or query) others' responses, but do not confirm or reject any of the ideas. Note any 'wonderings' that could become the basis for a subsequent maths investigation.

Main event

(D) **Digital activity: Patterns in the Garden**
MAM **Routine: Reason & Respond**

Display the poster. Ask the children to answer the following questions and to give reasons for their responses, where appropriate:

Assessment Opportunity

- What is a pattern? How can we tell if something is a pattern?
- Can you describe the patterns in the school garden?
- How are they the same? How are they different?
- Do any of the patterns change? How do they change?
- Which patterns are repeating? Explain how you know.
- Which patterns are growing? Explain how you know.
- Which patterns are shrinking? Explain how you know.
- Which patterns are symmetrical? Explain how you know.
- Pick a pattern. What do you think would come next?
- Pick a pattern. What do you think would come before?

Prompt the children to find other examples of patterns in the poster, discussing and describing what type of patterns they are, and giving reasons for their answers as appropriate.

Let's deepen

Through discussion, the children may suggest such terminology as 'core' and/or 'rule' to justify their reasoning. If this is the case, challenge them to use this terminology to describe all of the patterns.

C Concrete activity: Creating Patterns

Distribute resources that can be used to create various patterns to each child. Prompt the children to create patterns that go in a variety of orientations, rather than just horizontally (e.g. vertically, diagonally, in spirals/waves). When the patterns are complete, ask the children to describe them. The children can also swap places with a partner to extend each other's pattern.

Optional consolidation and extension possibilities

Maths Eyes Go for a walk through the school and/or local area, looking for patterns. The children could bring paper and pencils to record the patterns they see, or use digital devices to collect digital images. Collect examples of patterns from catalogues, magazines, flyers from shops, etc. The images could also be added to the classroom display.

Games Bank Play 'Mirror Patterns' or '2-D Gatekeeper'.

Story Read and discuss the images in *Patterns in the City* by J. Clark Sawyer, *Patterns in the Park* by J. Clark Sawyer, *Patterns in the Jungle* by Joyce L. Markovics, or *Spotty, Stripy, Swirly: What Are Patterns?* by Jane Brocket.

Maths Journal The children draw/write or stick images of patterns in their copy. They also record, using images and/or words, how they created their patterns in the main part of this lesson. They draw their own pattern and then challenge another child to complete/extend it.

Pattern Display Set up a display of patterns. The children contribute examples of their own work/constructions from this lesson and label them. Ask some children to begin a pattern and then leave it at the display so that others can continue it.

Integration Given that the overarching theme for this unit is also The School Garden, there are the same opportunities for cross-curricular integration as listed in Lesson 1 of Unit 10. For further suggestions, see Supporting the Learning of Patterns, Rules and Relationships Throughout the Year on pages 192–3.

Visual Arts Use the internet to look at and respond to examples of patterns in art, especially geometric art. Afterwards, the children produce their own examples.

Review and Reflect Use the Prompt Questions Poster.

Day 2, Lesson 2

Repeating Patterns

Focus of learning (with Elements)

- Identifies and describes repeating patterns, including the 'core' (U&C)
- Copies, extends, creates and translates repeating patterns of increasing complexity (U&C)
- Uses the 'core' to complete/extend the pattern, and to make generalisations in order to find a given term (R)

Learning experiences

- D Digital activity: Same But Different – Patterns (1) ***MAM* Routine: Reason & Respond, with Think-Pair-Share**
- D Video: Repeating Patterns ***MAM* Routines: Reason & Respond, with Write-Hide-Show**
- C Concrete activity: Repeating Patterns ***MAM* Routines: Reason & Respond, with Write-Hide-Show**
- P Pupil's Book page 71: Repeating Patterns

Equipment

- Interlocking cubes, counters, any other available classroom resources that could be used to create patterns, such as pegs and pegboards, beads, dominoes, links, attribute bears, pattern blocks, 2-D and 3-D shapes, buttons, and objects from nature
- Scissors
- Tracing paper
- PCM 37

Maths language

- elements, core, predict, next, before, continue, term

Teacher note: While the patterns represented in the print and digital resources are most often presented horizontally for efficient use of space, when the children are creating patterns using physical resources, encourage them to create patterns in a variety of orientations rather than horizontal only (e.g. vertical, diagonal, in spirals, waves).

Warm-up

D **Digital activity: Same But Different – Patterns (1)**
***MAM* Routine: Reason & Respond, with Think-Pair-Share**

Play the slideshow and, using Think-Pair-Share, ask the children to propose reasons for why the images are the same or why they are different.

Main event

D **Video: Repeating Patterns**
***MAM* Routines: Reason & Respond, with Write-Hide-Show**

Reflecting on the images from the slideshow displayed for the warm-up, ask the children to use maths words to describe the patterns they viewed. Ask them to explain the maths words with examples. Next, play the video, and allow the children time to answer the questions and to give reasons for their responses.

C **Concrete activity: Repeating Patterns**
***MAM* Routines: Reason & Respond, with Write-Hide-Show**

Using a classroom resource, create a simple pattern with one attribute (e.g. colour), ensuring that it contains at least three sections of four terms that repeat (e.g. yellow, red, red, blue; yellow, red, red, blue; yellow, red, red, blue). Display it to the class and ask:

Assessment Opportunity

- What type of pattern is this? Explain how you know. (repeating pattern)
- How many elements are there in the core? What are they?
- I don't believe it! Prove it! How might you prove that you are correct? (Break it apart into individual core pieces and lay them together to see they are the same.)
- How could we continue this pattern? What should be added and where?
- Can you continue a pattern from the start, in the opposite direction? (Yes, because unless a start point is specified, we should assume that a repeating pattern can be continued in both directions, indefinitely.)
- How many terms of this pattern can you see? (12)
- If we continued this pattern to the right, what would be the 15th term? What would be the 20th term?
- How could you label this pattern with letters? (YRRB i.e. yellow, red, red, blue or ABBC)

Using the available resources, make a pattern of the same type, with the same rule (i.e. translate this pattern using different objects).

Translate this pattern into a sound and/or action pattern.

Repeat the activity, using other pattern types, such as: ABCD; ABBC; ABCC; AABC; ABCB. For more, see PCM 37: Repeating Pattern Cards. The children cut out the cards and turn them face down, then take one and try to create the pattern specified, using the available resources. When ready, allow the children time to create their own repeating patterns.

Pair Work Options:

- Child A creates their own repeating pattern – or chooses a repeating pattern card from PCM 37 and creates that pattern. Child B is asked to identify the pattern type (which could be checked against the card chosen).
- Child A creates a pattern, which Child B must extend and/or translate (i.e. make a pattern with the same rule, but using different objects).
- Challenge the children to work out what would be the 10th/15th/20th term of their pattern, without physically extending it that far.

Let's strengthen

The children may benefit from using a number line, so as to be able to place the terms of the pattern above or below a number in sequence. Alternatively, the children could make the pattern on a line of MWBs, using a marker to write the numbers in sequence alongside the pattern.

Let's deepen

Challenge the children to write descriptions and/or use letters to label as they create more complex patterns. These could include:

- A pattern with two or more attributes, made using available suitable resources (e.g. attribute/logic blocks, attribute bears/people, tangram pieces of different colours, such as a small yellow triangle, a large yellow triangle, a small red triangle)
- A pattern with a longer core, making more than one line.

Pupil's Book page 71: Repeating Patterns

Let's strengthen

Some of the patterns have been deliberately chosen because they represent resources available in most classrooms (e.g. tangram pieces, attribute bears, interlocking cubes). The children may benefit from having access to the concrete resources, so that they can replicate the patterns presented, and then manipulate the concrete resources to identify the missing parts.

The children may need extra support to identify the pattern core. After replicating the pattern, using concrete resources, the concrete resources could then be partitioned into sections to identify the core. Alternatively, the children could use tracing paper; when they think they have identified the core, ask them to trace over it and move their tracing across to test whether they are correct.

Let's deepen

Challenge the children to do the following:

- Identify the missing elements without relying on the use of concrete resources (e.g. to use their reasoning about the location of similar elements in other parts of the pattern).
- Apply their understanding of each pattern beyond what is visible or would be immediately adjacent to either end of the visible pattern (e.g. by asking them to predict the 10th, 15th or 20th term). Can they come up with a generalisable model that justifies their reasoning, for example, by recognising that the 3rd/6th/9th term is always a small triangle, and therefore the 15th term must also be a small triangle?
- Create a repeating pattern, using different orientations. Can they create a pattern that has a core both horizontally and vertically?

Optional consolidation and extension possibilities

Story Read *Pattern Fish* by Trudy Harris. Can the children identify the core of the patterns? Can they label the patterns? Can they translate the patterns in the book, using the available resources in the classroom?

Watch *'Banana, Banana, Meatball'* by Blazer Noodle. Can the children identify the core of the patterns? Can they translate the patterns in the song, using the available resources in the classroom? See edco.ie/5gk8

Integration PE: Incorporate repeating patterns into movement breaks and warm-ups (e.g. clap, run on the spot, jump, clap, run on the spot, jump, and so on). When lining up, ask children to line up in an AB, ABB, AAB or AABB pattern, using actions such as: arms crossed, fingers on the lips, arms out to the right, arms out to the left, arms up, arms to the side.

Song Introduce songs with repeated actions (e.g. 'A Sailor Went to Sea Sea Sea').

Maths Journal The children draw or stick images of patterns in their copy, and/or record (using images), the patterns they created in the main part of this lesson. They could also draw their own pattern and challenge another child to complete/extend it.

Online Game Play 'Shape Patterns', a multiple choice game with three levels of difficulty. See edco.ie/dmjp

Let's Strengthen Use the PCM to consolidate this lesson.

Let's Deepen Challenge the children to complete some of the tasks on the PCM.

Online Tools Use digital pattern blocks to create repeating patterns. See edco.ie/zvtq

Classroom Display Add more examples of the children's work to the display.

Review and Reflect Use the Prompt Questions Poster.

Day 3, Lesson 3

Growing or Shrinking Patterns

Focus of learning (with Elements)

- Describes quantitative change in growing or shrinking patterns (C)
- Applies the rules that govern growing or shrinking patterns to extend to next terms, and to predict future values (R)
- Investigates and applies a function to a sequence of numbers (e.g. add 2) (A&PS)

Learning experiences

- (D) Digital activity: Same But Different – Patterns (2) ***MAM* Routines: Reason & Respond, with Think-Pair-Share**
- (D) Video: Growing and Shrinking Patterns ***MAM* Routines: Reason & Respond, with Write-Hide-Show**
- (C) Concrete activities: Growing or Shrinking Patterns ***MAM* Routines: Reason & Respond, with Write-Hide-Show**
- (P) Pupil's Book page 72: Growing or Shrinking Patterns

Equipment

- Interlocking cubes, counters, any other available classroom resources that could be used to create patterns, such as pegs and pegboards, beads, dominoes, links, attribute bears, pattern blocks, 2-D and 3-D shapes, buttons, and objects from nature
- 100 squares

Maths language

- change, adding, subtracting, rule

Warm-up

(D) **Digital activity: Same But Different – Patterns (2)** ***MAM* Routines: Reason & Respond, with Think-Pair-Share**

Play the slideshow and, using Think-Pair-Share, ask the children to propose reasons for why the images are the same or why they are different.

Main event

(D) **Video: Growing and Shrinking Patterns** ***MAM* Routines: Reason & Respond, with Write-Hide-Show**

Reflecting on the images from the slideshow displayed for the warm-up, ask the children to use maths words to describe the patterns they viewed. Ask them to explain the maths words with examples. Next, play the video, and allow the children time to answer the questions and to give reasons for their responses.

(C) **Concrete activities: Growing or Shrinking Patterns** ***MAM* Routine: Reason & Respond, with Write-Hide-Show**

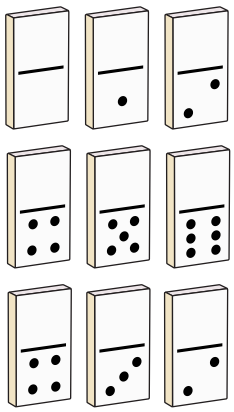
1. Concrete Resources

Ask the children to explore creating their own growing and shrinking patterns, using the available concrete resources. Options include the following:

Assessment Opportunity

- Child A asks Child B to identify the pattern type (i.e. growing or shrinking) and the rule of the pattern (e.g. −1, −2 ...).
- Child A asks Child B to extend the pattern and/or translate the pattern (i.e. make a pattern with the same rule, but using different objects).
- Challenge the children to work out what would be the 4th, 7th and/or 10th term of their pattern without extending it that far (e.g. they could use drawings or make a table).

Teaching tip



Dominoes, if plentiful, are useful as the children could create growing or shrinking patterns from the dots (see examples).

2. Number Patterns on the MWB

With the children using their MWBs, ask/say:

- Write a number greater than 5, but less than 10. Now, write a number one more than this; and again; and again; and again. What do you notice? (list of numbers going up by one each time, growing pattern)
- Write a number greater than 15, but less than 20. Now, write a number one less than this; and again; and again; and again. What do you notice? (list of numbers going down by one each time, shrinking pattern)
- Write a number greater than 5, but less than 10. Now, write the number you get if you add 2 to this number; and again; and again; and again. What do you notice? (numbers going up by 2 each time, growing pattern)
- Write a number greater than 15, but less than 20. Now, write the number you get if you subtract 2 from this number; and again; and again; and again. What do you notice? (numbers going down by 2 each time, shrinking pattern)

Repeat using other starting numbers and jumps (e.g. write a number ending in 0, add/subtract 10 or 5 each time). The children could also work in pairs: Child A creates their own sequence of numbers in this way, and Child B works out what they did to the numbers to create the list.

Let's deepen

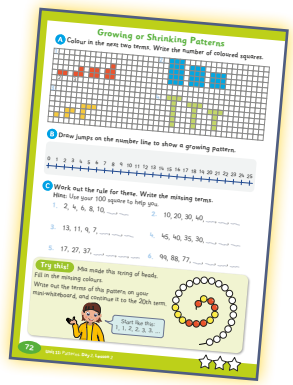
Challenge the children to recall the name that could be given to the set of numbers they wrote when adding or subtracting 2 each time (i.e. odd or even).

3. 100 Square

Direct the children towards the 100 square on the inside cover of the Pupil's Book (or display the digital version on the IWB), and to examine it to identify growing and shrinking patterns. If necessary, use any of the following prompts:

- Trace your finger along a row from left to right. What is happening to the numbers? How could we record the rule?
- Trace your finger along a row from right to left. What is happening to the numbers? How could we record the rule?
- Trace your finger along a column from top to bottom. What is happening to the numbers? How could we record the rule?
- Trace your finger along a column from bottom to top. What is happening to the numbers? How could we record the rule?
- Trace your finger along a diagonal from top left to bottom right. What is happening to the numbers? How could we record the rule?
- Trace your finger along a diagonal from top right to bottom left. What is happening to the numbers? How could we record the rule?
- Do you notice any other patterns on the 100 square?
- What if we use the 100 square to count or skip count; what patterns can be found?

P **Pupil's Book page 72: Growing or Shrinking Patterns**



Let's strengthen

Activities B and C in the Pupil's Book page 72: The children may benefit from the support of their 100 square for the number sequences.

Let's deepen

Encourage the children to work out the missing terms without relying on supports.

Optional consolidation and extension possibilities

Story Read a cumulative/diminishing story, such as *Rooster's Off to See the World* by Eric Carle and/or *Mrs McTats and Her Houseful of Cats* by Alyssa Satin Capucilli. Ask the children to describe and/or use manipulatives/drawings to show what is being added or subtracted at each stage of the story. Other suitable books include *Super Specs* by Laura Driscoll and *What's Next, Nina?* by Sue Kassirer.

Song Introduce cumulative and diminishing songs, such as 'Ten Green Bottles', 'Eight Silly Monkeys', 'B-I-N-G-O' (in which in each successive verse, one more letter is replaced with a clap – an example of a growing pattern) and 'There Was an Old Woman Who Swallowed a Fly'.

Maths Journal The children record, using images and/or numbers, the patterns that they created in the main part of this lesson. The children work in pairs: Child A draws their own growing/shrinking pattern and then challenges Child B to complete/extend it.

Classroom Display The children contribute and discuss/describe real objects from nature that are examples of growing/shrinking patterns, and add these to the display.

Maths Eyes Explore growing or shrinking patterns in the school/local environment (e.g. house/room numbers, book pages, flower petals, pinecones). Look at other tables and grids to discuss the patterns that are evident (e.g. a calendar showing one month to a page, an addition square). Use digital devices to collect images.

Continuing the Learning Incorporate growing and shrinking patterns as a regular activity throughout the year (e.g. during station teaching and morning activities). When solving challenging tasks and problems, prompt the children to look for patterns to help them find the solutions. For further suggestions, see Supporting the Learning of Patterns, Rules and Relationships Throughout the Year on pages 192–3.

Online Tools Use digital pattern blocks to create growing/shrinking patterns. See edco.ie/zvtq

Review and Reflect Use the Prompt Questions Poster.

Day 4, Lesson 4

Patterns in Odd or Even Numbers

Focus of learning (with Elements)

- Building on examples of numbers below 100, generalises number rules (e.g. even numbers end in 0, 2, 4, 6 or 8, no matter how big the number is) (R)
- Recognises and describes patterns that emerge in the addition and subtraction of odd/even numbers (C)
- Explores and records a broad range of patterns in a hundred square (U&C)

Learning experiences

- D Digital activity: Same but Different – Number Patterns
  ***MAM* Routines: Reason & Respond, with Think-Pair-Share**
- C Concrete activity: Number Rules ***MAM* Routine: Choral Counting**
- D Digital activity: Number Shapes
  ***MAM* Routines: Concept Cartoon, with Think-Pair-Share**
- P Pupil's Book page 73: Patterns in Odd or Even Numbers

Equipment

- 100 squares
- Interlocking cubes
- Counters
- Number shapes
- Ten frames

Maths language

- odd, even, rule, multiple

Teacher note: Visualising odd and even numbers

The children need to be able to 'visualise' odd and even numbers, not just identify them. Using concrete materials (e.g. number shapes and/or pairwise ten frames) and pictorial representations is vital for the children to really develop their number sense and their appreciation of how odd and even numbers interact.

Teacher note: In Unit 2, Addition and Subtraction 1, Lesson 3: Doubles and More Doubles, the children began to appreciate what happens when identical odd or even numbers are combined. This lesson builds on that, and extends it to explore the general rule for the addition and subtraction of odd and even numbers.

Warm-up

D Digital activity: Same but Different – Number Patterns ***MAM* Routines: Reason & Respond, with Think-Pair-Share**

Display the slideshow. Using Think-Pair-Share, ask the children to propose reasons for why the images are the same and why they are different.:

C Concrete activity: Number Rules
***MAM* Routine: Choral Counting**

Direct the children towards the 100 square on the inside cover of the Pupil's Book (or display the digital version on the IWB), and say/ask:

- Let's count in tens together: 10, 20, 30 ... These are also called the multiples of 10. What do you notice about the multiples of 10? What is the rule for the multiples of 10 (i.e. what is the same about all of them)? (They all end in 0.)
- Let's count in fives together: 5, 10, 15, 20 ... These could also be called the multiples of what? (5)
- What is the rule for the multiples of 5 (i.e. what is same about all of them)? (They all end in 5 or 0.)
- Let's count in twos together: 2, 4, 6, 8, 10 ... What name could we give to these numbers? (even numbers, multiples of 2)
- What is the rule for the even numbers (i.e. what is same about all of them)? (They all end in 2, 4, 6, 8 or 0.)
- Let's count together in the numbers that are not even: 1, 3, 5, 7, 9... What name could we give to these numbers? (odd numbers)
- Could these numbers be called the multiples of 1? Explain why.
- What is the rule for the odd numbers? (They all end in 1, 3, 5, 7 or 90.)

Main event

D Digital activity: Number Shapes ***MAM* Routines: Concept Cartoon, with Think-Pair-Share**

Display the Concept Cartoon, which reveals the number shapes for 2 to 10. Ask: 'What happens when you add or subtract odd or even numbers?' Using Think-Pair-Share, ask the children to answer the following questions and to give reasons for their responses:

Assessment Opportunity

- What do you notice?
- What do you wonder?
- What numbers have similar shapes? Why is this? (2, 4, 6, 8 and 10 are similar. So too are 3, 5, 7, 9.)
- What name(s) can we give to the groups of numbers with similar shapes? (even and odd)
- Would you recognise whether a number is odd or even just by its shape? How?
- The shape for number 1 is not there. To which group would it belong? Explain why.
- The shape for 0 is not there. To which group would it belong? Explain why.

Teacher note: The most widely accepted view among mathematicians is that 0 is an even number. If all even numbers are the result of a number being double, then 0 is even, since double 0 is 0; if all even numbers can be divided into two equal amounts, then 0 is even, since 0 divided into two equal amounts is 0.

Then click each character to hear them propose their ideas about operations with odd and even numbers. Using Think-Pair-Share, ask:

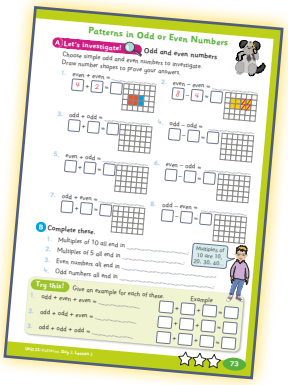
- What do you think?
- (Point to a specific character.) Do you agree with their idea? Explain why.
- Do you think something different? What do you think? Why do you think this?

If appropriate, record the children's responses to these questions on the board. Allow the children the opportunity to respond to (agree/disagree with or query) others' responses, but do not confirm or reject any of the ideas. Ask:

- How could we find out?

Ask the children to present their suggested approaches and/or solutions. Using Activity A on page 73 of the Pupil's Book, ask the children to record their findings, including supporting images and/or using concrete examples as appropriate to justify their reasoning.

Pupil's Book page 73: Patterns in Odd or Even Numbers



Optional consolidation and extension possibilities

Story Read *Missing Mittens* by Stuart J. Murphy, *Color Me Even, Color Me Odd* by Marcie Aboff, *Even Steven and Odd Todd* by Kathryn Cristaldi, *If You Were an Even Number* by Marcie Aboff and/or *If You Were an Odd Number* by Marcie Aboff.

Pattern Display The children make posters of odd and even numbers and add these to the display.

My Maths Fact File Page 123 can be completed at any stage after this lesson.

Home/School Links Book Page 26 can be completed at any stage after this lesson.

Let's Deepen Challenge the children to complete some of the tasks on the PCM.

Online Tools Use digital number shapes to explore odd and even numbers. See edco.ie/2y3b

Games Bank Play 'Odds and Evens' or 'Odds and Evens Totals' (Pupil's Book page 118).

Review and Reflect Use the Prompt Questions Poster.

Day 5, Lesson 5

Review and Reflect

Focus of learning (with Elements)
• Reviews and reflects on learning (U&C)

Warm-up

Carry out a warm-up activity of your choice from one of the lessons in this unit.

Main event

Use this menu of activity ideas to choose how best to structure this last lesson of the unit to suit your needs and the needs of your class.

Let's talk!	Let's create!
Use Think-Pair-Share to review the unit. Individual children could present examples of their own drawings/work/constructions to the class, and talk about what they have learned.	Ask the children to use physical objects to create a repeating pattern with a core of three, showing at least three repeats of the core. Then: (1) translate the pattern into a drawing, representing it in different ways (e.g. using different shapes, colours); (2) label the pattern; (3) predict the 30th element of the pattern and explain why. Ask the children to use physical objects to create a growing or shrinking pattern with four terms. Then: (1) translate the pattern into a drawing and/or numbers; (2) show the pattern rule; (3) predict the 5th, 6th and 7th terms and explain why.
Maths language	**Maths strategies and models**
Ask the children to explain the following terms, perhaps using examples or drawings on their MWB: patterns, repeating, growing, shrinking, symmetrical, elements, core, term, rule, odd, even. Use the Unit 11 Maths Language Cards to revise key terms. For example: if the image and text are cut apart, can the children match them? Complete the My Maths Fact File on page 123 of the Pupil's Book.	Ask the children to give examples of the strategies (e.g. how to identify the core/rules of patterns; rules of adding and subtracting odd and even numbers) and models (concrete materials, drawings of same, etc.) used in this unit. Were there any strategies or models that they preferred? Why?
Progress Assessment Booklet	**Maths eyes**
Complete Questions 43-44 on page 21. Alternatively, these can be left to do as part of a bigger review during the next review week.	See the suggestions listed under Optional Consolidation and Extension Possibilities in Lesson 1. If already completed during Lesson 1, the activities could be repeated to elicit whether the children now have a greater depth of understanding, and are using more mathematical language to describe what they had previously seen.
Let's strengthen	**Let's deepen**
Identify children who might benefit from extra practice with some of the key concepts or skills in this unit. Use the Unit 11 Let's Strengthen PCM. Consult the Unit 11 Let's Strengthen Suggestions for Teachers.	Use the Unit 11 Let's Deepen PCM.

Notes