# Numicon 1/NZ Year 2 Planning

The overviews and links in this document will help you to get the most out of your subscription to *Numicon Online NZ*.

You can follow *Numicon* as a complete teaching programme using the long-term plan provided here.

You can also access the rich bank of activities and resources to supplement your teaching. Pick a topic on the long-term plan, click on it for details and to open it in the online handbook.

# Contents

## Long-term plan — Page 2

This long-term plan shows you the recommended order for teaching the Numicon 1/NZ Year 2 Activity Groups over the school year. It includes links to the overview information for each Activity Group and links to open those activities in the online handbooks. Milestone markers on the plan take you to the skills and understanding children need to be secure in to help them progress.

| Strand and Activity Group Number | | Activity Group Title |
|---|---|---|
| Securing Foundations | 1 | Learning about Numicon Shapes, number rods, pattern and counting |
| Securing Foundations | 2 | Naming Numicon Shapes, building patterns and counting objects |
| Securing Foundations | 3 | Building Numicon Shape patterns, more repeating patterns and number lines |
| Securing Foundations | 4 | Comparing and ordering, more patterns, beginning calculating |
| Securing Foundations | 5 | Describing relationships, more adding and patterns in movement |
| | | NPC Milestone [1] |

## Details for each unit of learning — Page 5

These are overviews for each Activity Group. They follow the order in the long-term plan and list every activity in the Activity Group. Log into your subscription to Numicon Online NZ first, then click on any activity to open it in the online handbook. When you're in the online handbook you can go to the Links tab and download the accompanying resources, including any Explorer Progress worksheets, photocopy masters or Explore More homework.



## Assessment support — Page 46

Milestone statements help you assess progress throughout the year and inform your teaching and planning. They indicate the skills and understanding children need to be secure in as they progress through the teaching programme before they are able to successfully meet new ideas. This section includes a link to the set of question cards that can be used for assessment or self-assessment and to a tracking spreadsheet to help you record that information.

| Milestone | Code | NPC / GM | Numicon strand | AG | NC strand |
|---|---|---|---|---|---|
| **Number, Pattern & Calculating 1 Milestone 1** | | | | | |
| By this point, children should be able to: | | | | | |
| • Create repeating patterns that have more than two elements using structured apparatus and other objects | NPC 1: 1a | NPC | P&A | SF1 | Number & place value |
| • Recognize pattern in familiar sequences and predict what comes next | NPC 1: 1b | NPC | P&A | SF2 | Number & place value |
| • Order Numicon Shapes, number rods and numerals 0–10 | NPC 1: 1c | NPC | NNS | SF4 | Number & place value |
| • Describe number relationships between Shapes | NPC 1: 1d | NPC | NNS | SF5 | Number & place value |
| • Identify numerals and represent them using Numicon Shapes, Numicon Shape patterns and number rods | NPC 1: 1e | NPC | P&A | SF3 | Number & place value |
| • Recite number names in order up to (record child's counting range) | NPC 1: 1f | NPC | NNS | SF2 | Number & place value |
| • Count at least 30 objects accurately, one by one | NPC 1: 1g | NPC | NNS | SF2 | Number & place value |
| **Number, Pattern & Calculating 1 Milestone 2** | | | | | |
| By this point, children should be able to: | | | | | |
| • Compile sets according to a chosen criterion; explain why an object does not fit the set | NPC 1: 2a | NPC | P&A | SF9 | Number & place value |
| • Assign numbers to repeating patterns using structured apparatus and other media | NPC 1: 2b | NPC | P&A | SF7 | Number & place value |
| • Read, say and build teen numbers from seeing numerals | NPC 1: 2c | NPC | NNS | SF6 | Number & place value |
| • Build teen numbers using Shapes and rods and write numerals from hearing number names | NPC 1: 2d | NPC | NNS | SF8 | Number & place value |

# Long-term plan for Numicon 1 (NZ Year 2)

There are two Numicon teaching handbooks for each year group – Number Pattern Calculating (NPC) and Geometry measurement and Statistics (GMS). Subscribers to *Numicon Online NZ* have access to a digital version of these. Print versions are also available (visit: www.edushop.nz). The units in these books are called Activity Groups. They contain a collection of activities you can use with your class.

This long-term plan shows you the recommended order for teaching the Activity Groups over the school year.
• Click on a heading in the **left** column to get all the information for that Activity Group.
• Click on an Activity Group title in the **right** column to go straight to those activities in the online handbooks.

## Milestones

To help you monitor learning, the skills and understanding children need to be secure with as they progress through the programme have been captured in a series of milestone statements. Click on the milestone icons to see these. Extra support to help you use these is provided at the end of this document.

# Number, Pattern and Calculating 1

# Geometry, Measures and Statistics 1

# Statistics and Probability Booklet 1

Each Activity Group should take around one week. However, some may take more/less time than others, so please use your professional judgment to fit the Activity Groups into your school year.

| Strand and Activity Group Number | | Activity Group Title |
|---|---|---|
| Securing Foundations | 1 | Learning about Numicon Shapes, number rods, pattern and counting |
| Securing Foundations | 2 | Naming Numicon Shapes, building patterns and counting objects |
| Securing Foundations | 3 | Building Numicon Shape patterns, more repeating patterns and number lines |
| Securing Foundations | 4 | Comparing and ordering, more patterns, beginning calculating |
| Securing Foundations | 5 | Describing relationships, more adding and patterns in movement |
| | | NPC Milestone 1 |
| Securing Foundations | 6 | Naming number rods, investigating teen numbers and finding totals |
| Securing Foundations | 7 | More about teen numbers, number patterns, adding |
| Securing Foundations | 8 | Beginning subtracting, sorting, more number patterns |
| Securing Foundations | 9 | Sorting, more practical subtracting |
| | | NPC Milestone 2 |
| Securing Foundations | 10 | Comparing lengths and weights, more subtracting |
| Securing Foundations | 11 | Counting and adding |
| Securing Foundations | 12 | Similar attributes, numbers to 20 and the '+' symbol |
| | | NPC Milestone 3 |
| Pattern and Algebra | 1 | Preparing for equivalence and using the '=' symbol |
| Calculating | 1 | Introducing the subtracting symbol |
| Numbers and the Number System | 1 | Ordering numbers to 20 |
| Calculating | 2 | Adding and subtracting 1 and 2 |
| Geometry | 1 | Recognizing and naming 2D shapes |
| Measurement | 1 | Comparing, ordering and measuring lengths |
| Measurement | 2 | Introducing coins |
| Calculating | 3 | Money |
| | | NPC Milestone 4 |
| Numbers and the Number System | 2 | Finding how many by grouping |
| Measurement | 3 | Units of time |
| | | GMS Milestone 1 |

| Strand and Activity Group Number | | Activity Group Title |
|---|---|---|
| Geometry | 2 | Making pictures, shapes and patterns |
| Calculating | 4 | Exploring adding and subtracting facts to 10 |
| Measurement | 4 | Comparing, ordering and measuring heaviness |
| Statistics and Probability | 1 | Understanding pictograms, data and chance |
| Calculating | 5 | Halves and quarters of wholes |
| | | **NPC Milestone** 5 |
| Measurement | 5 | Comparing, ordering and measuring capacity |
| Pattern and Algebra | 2 | Reasoning with Numicon Shapes and number ideas |
| Pattern and Algebra | 3 | Odd and even |
| Calculating | 6 | Understanding subtracting as 'difference' and as 'how many more?' |
| Geometry | 3 | Recognizing and imagining common 3D shapes |
| | | **GMS Milestone** 2 |
| Numbers and the Number System | 3 | Exploring number lines and counting in steps |
| Calculating | 7 | Developing recall of adding and subtracting facts within 10 |
| | | **NPC Milestone** 6 |
| Numbers and the Number System | 4 | Structure of 2-digit numbers and more ordering |
| Pattern and Algebra | 4 | Logic |
| | | **NPC Milestone** 7 |
| Geometry | 4 | Comparing and naming common solid 3D shapes |
| Calculating | 8 | Adding more than two numbers |
| Calculating | 9 | Partitioning into tens and ones |
| Measurement | 6 | Telling the time |
| Pattern and Algebra | 5 | Finding possibilities |
| | | **NPC Milestone** 8 |
| Geometry | 5 | Position, direction and movement |
| | | **GMS Milestone** 3 |

# Securing Foundations 1: Learning about Numicon Shapes, number rods, pattern and counting

**Key mathematical ideas**   Pattern, Ordering, Counting, Mathematical thinking and reasoning

## Educational context

In the Getting Started focus activities, children will be exploring the Numicon Shapes and number rods independently, before working with the teacher to arrange the Numicon Shapes in order of size and develop the associated language. The Pattern and Algebra focus activities explore with the whole class the ideas of sequence and order through daily routines and recommend establishing a daily 'morning maths meeting'. Children follow this up with independent work on what makes the days of the week special. The Numbers and the Number System focus activities include exploring numbers of personal significance to children and counting. The whole-class counting practices should be repeated often to consolidate and extend children's oral counting, and to help them connect counting to patterns and relationships in the number system.

## Learning opportunities

**Getting Started**
• To become familiar with Numicon Shapes and number rods and use them to make pictures and patterns.
• To begin to see patterns in number relationships.
• To be able to place Numicon Shapes in order.

**Pattern and Algebra**
• To describe a sequence of events or actions.
• To predict what will happen next in a familiar routine.
• To realize that using numbering for a sequence of events or a list helps us to remember the order.
• To learn the sequence of the days of the week.
• To use ordinal number words with sequences.

**Numbers and the Number System**
• To learn the forward counting sequence and to begin to recognize patterns within it.
• To develop strategies for counting objects accurately.
• To understand that the numerical size of a collection of objects is given by the last number in the count.
• To begin to make sensible estimates of the sizes of collections of objects.
• To relate counting on and back to the number line.

## Terms for children to use

turn, flip, upside down, sideways, next, before, after, in between, ordinal number words (e.g. first, second, third), words for comparing, set
days of the week, yesterday, today, tomorrow, first, last, repeat, predict, instruction, timetable, put in order, numbering, sequence, events
number names one to thirty, count, more, check, how many?, estimate, forwards, backwards

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Getting Started**
• Give number names to Numicon Shapes.
• Notice patterns in the ordered sequence of Numicon Shapes and use these to predict what the next Shape might look like.
**Pattern and Algebra**
• Suggest using Numicon Shapes and/or number rods to represent numbers.
• Place events in sequence.
• Suggest that numbering a list is helpful when putting the items in order.
**Numbers and the Number System**
• Recite the counting sequence, are aware of their counting range and can count on from any number within their range.
• Have developed strategies for counting up to 10 objects (extending to 20 and 30) accurately, saying one number name for each object counted.
• Relate their counting to the number line, find the last number in the count and know this tells them how many they have counted.
• Are beginning to make a good estimate of the size of a collection within their counting range.

## NPC Milestone 1

**Pattern and Algebra**
• Create repeating patterns that have more than two elements using structured apparatus and other objects (NPC 1:1a)

## Explorer Progress Book 1a, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 1: Clever Counting

After completing work on Numbers and the Number System Activity 3, give children Explore More Copymaster 1: Clever Counting to take home.

## Focus activities

**Getting Started**
1. Exploring the Numicon Shapes
2. Cover the board with Numicon Shapes
3. Exploring the number rods
4. Ordering Numicon Shapes
5. Exploring ordering with Numicon Shapes

**Pattern and Algebra**
1. Doing things in order
2. Setting daily class routines
3. Following weekly class routines
4. Following a circuit in PE
5. Days of the week and what makes them special

**Numbers and the Number System**
1. Numbers of personal significance
2. Reciting the counting sequence of number names
3. Counting small collections of objects accurately

# Securing Foundations 2: Naming Numicon Shapes, building patterns and counting objects

**Key mathematical ideas** Pattern, Ordering, Counting, Mathematical thinking and reasoning

## Educational context

In the Getting Started strand, children develop their mental imagery as they feel for Shapes in the Numicon Feely Bag and learn to build the Numicon Shape patterns for each Numicon Shape. The Pattern and Algebra activities allow children to recognize, copy, continue and devise repeating patterns and encourage children to understand that when they see a pattern, they can predict. Counting in the Numbers and the Number System strand will help children develop counting skills and extend counting ranges; 'Counting small collections of objects accurately' should be taught in focus groups to assess children's ability to count one-to-one to at least 10 and relate this to the number line. You will already notice some children are ready to move on while some need support. Remember to check that all children are able to join in mathematical conversations. For further educational context and teaching support, please see pages 36–41.

## Learning opportunities

**Getting Started**
• To be able to place Numicon Shapes in order, with numerals.
• To begin to make the Numicon Shape patterns for each Numicon Shape without counting.

**Pattern and Algebra**
• To recognize examples of patterns and arrangements occurring around us.
• To begin to recognize that patterns follow rules.
• To be able to make organized arrangements with different equipment.

**Numbers and the Number System**
• To develop strategies for counting collections of objects accurately.
• To understand that the numerical size of a collection of objects is given by the last number in the count.
• To use a sense of the cardinal size of numbers within their counting range to make sensible estimates.
• To relate counting forwards and backwards to the number line.

## Terms for children to use

number names, pattern, next, before, after, in between, ordinal number words (e.g. first, second, third), visualize, imagine, see in your mind's eye
regular, repeat, next, pattern, repeating pattern, predict, arrange, build, make, copy, continue, what comes next? number names one to thirty, count, more, check, how many?, estimate, forwards, backwards

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Getting Started**
• Refer to Numicon Shapes using number names.
• Notice patterns in the ordered sequence of Numicon Shapes and use these to predict what the next Shape in the sequence might look like.
• Build Numicon Shape patterns with objects without counting.
**Pattern and Algebra**
• Create organized arrangements of objects in their play.
• Notice patterns that they see around them, and bring in examples.
• Copy and continue repeating patterns.
**Numbers and the Number System**
• Recite the counting sequence accurately and clearly.
• Have developed strategies for counting collections of up to 10, 20 or 30 objects accurately, saying one number name for each object counted.
• Use counting in practical situations when they need to know how many there are.
• Relate their counting to the number line, find the last number in the count on it and explain that this tells them how many they have counted.
• Are able to make a sensible estimate of the size of a collection containing a number of objects within their counting range.
• Say what the previous number is for any number within their counting range.
• Have a sense of where on the number line to find a number.

## NPC Milestone 1

**Pattern and Algebra**
• Recognize pattern in familiar sequences and predict what comes next (NPC 1:1b)
**Numbers and the Number System**
• Recite number names in order up to (record child's counting range) (NPC 1:1f)
• Count at least 30 objects accurately, one by one (NPC 1:1g)

## Explorer Progress Book 1a, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 2: Boat Patterns

After completing work on Pattern and Algebra Activity 3, give children Explore More Copymaster 2: Boat Patterns to take home.

## Focus activities

**Getting Started**
1. Giving Numicon Shapes number names
2. Labelling Numicon Shapes with numerals
3. Visualizing Numicon Shapes
4. Matching Numicon Shapes and Numicon Shape patterns
5. Building Numicon Shape patterns

**Pattern and Algebra**
1. Talking about patterns
2. Looking for patterns outdoors
3. Making repeating patterns with objects and sounds

**Numbers and the Number System**
1. Counting small collections of objects accurately
2. Reciting the counting sequence of number names
3. Counting small collections of objects accurately

# Securing Foundations 3: Building Numicon Shape patterns, more repeating patterns and number lines

**Key mathematical ideas**   Pattern, Counting, Grouping, Ordering, Mathematical thinking and reasoning

## Educational context

In the Getting Started activities, children continue to group objects into Numicon Shape patterns and also to draw them. By doing this often – and with different objects – children begin to generalize that, for example, 5 can represent five of 'anything'. This can be modelled to the whole class at different times, so children see how to build the Numicon Shape patterns without counting and can then practise building them independently. These activities, along with those in the Numbers and the Number System strand that connect Numicon Shape patterns with number lines, help children understand the cardinal and ordinal value of numbers. The work in the Pattern and Algebra strand focuses on order and repeating patterns, encouraging children to spot patterns and regularities and make predictions about what comes next. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Getting Started**
• To begin to make the Numicon Shape patterns for each Numicon Shape without counting.

**Pattern and Algebra**
• To describe a sequence of events or actions.
• To realize that using numbering for a sequence of events or list helps us to remember the order.
• To use ordinal number words when describing a sequence.
• To recognize repetitive patterns in stories and that knowing these patterns helps us to join in.
• To begin to recognize that patterns follow rules.
• To be able to make organized arrangements with different equipment.

**Numbers and the Number System**
• To develop strategies for counting collections of objects accurately.
• To understand that a collection of objects can be counted in any order.
• To understand that the numerical size of a collection of objects is given by the last number in the count.
• To use a sense of the cardinal size of numbers within their counting range to make sensible estimates.
• To relate counting forwards and backwards to the number line.
• To learn to write correctly formed numerals quickly and without hesitation.

## Terms for children to use

pattern, next, before, after, in between, ordinal number words (e.g. first, second, third), visualize, see in your mind's eye, next, before, between, after, first, last, repeat, predict, instruction, ordinal number names (e.g. first, second, third), put in order, which comes next?, what came before?, routine, order, pattern, numbering, sequence, events, regular, repeating pattern, build, make number names one to thirty, count, more, check, how many?, estimate, forwards, backwards, numeral

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use in conversation effectively in discussion.

**Getting Started**
• Refer to Numicon Shapes using number names.
• Notice patterns in the ordered sequence of Numicon Shapes and use these to predict what the next Shape in the sequence might look like.
• Build Numicon Shape patterns with objects without counting.

**Pattern and Algebra**
• Place events in sequence.
• Suggest that numbering a list helps to put the items in order.
• Create organized arrangements of objects in their play.
• Copy and continue repeating patterns.

**Numbers and the Number System**
• Have developed strategies for counting collections of up to 10,
• 20 or 30 objects accurately.
• Arrange objects counted into Numicon Shape patterns.
• Relate their counting to the number line, finding the last number in the count on the number line and explaining that this tells them how many they have counted.
• Write numerals in response to hearing the corresponding number names or seeing the corresponding Numicon Shapes.
• Know where on the number line to go to find a number.
• Are able to make a sensible estimate of the size of a collection within their counting range.

## NPC Milestone 1

**Pattern and Algebra**
• Identify numerals and represent them using Numicon Shapes, Numicon Shape patterns and number rods (NPC 1:1e)

## Explorer Progress Book 1a, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 3: Making Patterns

After completing work on Pattern and Algebra Activity 3, give children Explore More Copymaster 3: Making Patterns to take home.

## Focus activities

**Getting Started**
1. Visualizing Numicon Shapes
2. Matching Numicon Shapes and Numicon Shape patterns
3. Building Numicon Shape patterns
4. Recording Numicon Shape patterns

**Pattern and Algebra**
1. Following instructions to do things in order
2. Looking for patterns in stories
3. Making repeating patterns with objects and sounds

**Numbers and the Number System**
1. Counting larger collections of objects with number lines and Numicon Shape patterns
2. How many in the box?
3. Forming numerals using big body movements in PE
4. Writing numerals

# Securing Foundations 4: Comparing and ordering, more patterns, beginning calculating

**Key mathematical ideas** Pattern, Counting, Ordering, Adding, Mathematical thinking and reasoning

## Educational context

In this activity group, the Calculating strand is introduced with practical adding activities that will engage children in discussing how to solve everyday problems and learning that the structure of Numicon Shapes can be helpful when we need to 'find how many altogether'. The work on repeating patterns in the Pattern and Algebra strand is extended using the number rods and towers of cubes. The work on comparing and ordering in the Numbers and the Number System strand uses a variety of objects as well as number rods, laying useful foundations for children's later work on number and measures. Children continue to become skilled at building the Numicon Shape patterns and to consolidate earlier activities with the Numicon Number Lines. In all the strands, the focus is on helping children develop the language associated with the ideas they are meeting. For further educational context and teaching support, please see pages 36–41.

## Learning opportunities

**Getting Started**
• To make the Numicon Shape patterns for each Numicon Shape without counting.

**Pattern and Algebra**
• To be able to follow rules to copy and create patterns.
• To be able to make organized arrangements with different equipment.

**Numbers and the Number System**
• To develop strategies for counting objects accurately.
• To understand that objects can be counted in any order.
• To understand that the numerical size of a collection of objects is given by the last number in the count.
• To use a sense of the cardinal size of numbers within their counting range to make sensible estimates.
• To know objects must be aligned up evenly to compare lengths.
• To put number rods and other objects in size order.
• To recognize that the number rods increase in length incrementally, in equal steps.

**Calculating**
• To experience situations when it is useful to add.
• To be able to tell a number story and illustrate it with 'objects' and structured apparatus.
• To understand that 'add' and 'and' can both mean 'combine'.

## Terms for children to use

number names, pattern, next, before, after, in between, ordinal number words (e.g. first, second, third), visualize, repeat, last, predict, shape, repeating pattern, build, make, copy, continue, organize, put in order, what comes next?, what came before?
number names one to thirty, count, more, check, how many?, estimate, small, medium, large, comparative words (e.g. smaller than, longer than), 'next bigger', 'next smaller', nearly, combine, add, and, altogether, together, more, total, makes, equals

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.

**Getting Started**
• Refer to Numicon Shapes using number names.
• Notice patterns in the ordered sequence of Numicon Shapes and predict what the next Shape in the sequence might look like.
• Build Numicon Shape patterns with objects without counting.

**Pattern and Algebra**
• Copy and continue repeating patterns.
• Devise repeating patterns.

**Numbers and the Number System**
• Have developed strategies for counting collections of up to 10, 20 or 30 objects accurately.
• Arrange objects counted into Numicon Shape patterns.
• Know where on the number line to find the last number in their count and explain how many they have counted.
• Sensibly estimate the size of a collection.
• Pronounce the word 'than' clearly, e.g. they say 'shorter than' and not 'shorteran'.
• Place objects in order of size.

**Calculating**
• See a total when Numicon Shapes are combined, without counting the holes.
• Know when to add within their daily routines and when faced with mathematical problems.
• Are able to say a number sentence or number story clearly.

## NPC Milestone 1

**Numbers and the Number System**
• Order Numicon Shapes, number rods and numerals 0–10 (NPC 1:1c)

## Explorer Progress Book 1a, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 4: Adding Animals

After completing work on Calculating Activity 1, give children Explore More Copymaster 4: Adding Together to take home.

## Focus activities

**Getting Started**
1. Visualizing Numicon Shapes
2. Matching Numicon Shapes and Numicon Shape patterns
3. Building Numicon Shape patterns
4. Recording Numicon Shape patterns

**Pattern and Algebra**
1. Creating repeating patterns with number rods
2. Creating repeating patterns with towers of cubes

**Numbers and the Number System**
1. Counting larger collections of objects with number lines and Numicon Shape patterns
2. How many in the box?
3. Putting teddies in order of size
4. Ordering objects of different heights
5. Building towers
6. Putting number rods in order of length

**Calculating**
1. Exploring adding opportunities throughout the day
2. Finding how many altogether

# Securing Foundations 5: Describing relationships, more adding and patterns in movement

**Key mathematical ideas**  Pattern, Counting, Ordering, Adding, Mathematical thinking and reasoning

## Educational context

In these activities, children describe the all-important relationships they notice between the Numicon Shapes, using language for comparison, prepositions, ordinal and cardinal number words. Their ability to do this shows how far they are generalizing number ideas. The work in the Calculating strand on adding includes more on the increase structure and children listening to and telling their own adding stories.

Children's own stories indicate their understanding of the operation and their ability to use the associated language. The Pattern and Algebra activity involves creating repeating patterns in movement. Children will find it difficult to move onto Securing Foundations, Activity Group 6 before they have consolidated the activities in each of the strands in this group. For further educational context and teaching support, please see pages 36–41.

## Learning opportunities

**Getting Started**
• To be able to place Numicon Shapes in order, with numerals.
• To make connections between Numicon Shapes and number ideas, e.g. by connecting Numicon Shapes, numerals and number words with positions and distances on a number line.
• To describe number relationships using appropriate vocabulary (see Terms for children to use).

**Pattern and Algebra**
• To be able to follow rules to copy and create patterns.
• To be able to make organized arrangements with different equipment.

**Numbers and the Number System**
• To know that positions on the number line for whole numbers are evenly spaced and that they can be marked with a numeral, a number word or a Numicon Shape pattern.
• To know when it is helpful to use number order to organize or find things.
• To begin to read some number words from one to ten.

**Calculating**
• To understand adding as combining and as 'more of something'.
• To be able to tell a number story and illustrate it with 'objects' and structured apparatus.

## Terms for children to use

number names, pattern, next, before, after, in between, ordinal number words (e.g. first, second, third), words for comparing, set, repeating pattern, predict
more than, fewer than, last, put in order, organize, nearly combine, add, and, altogether, together, more, total, makes, equals, amount

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.

**Getting Started**
• Notice patterns in the ordered sequence of Numicon Shapes and use these to predict what the next Shape in the sequence might be.
• Refer to Numicon Shapes and number rods using number names.

**Pattern and Algebra**
• Devise repeating patterns.

**Numbers and the Number System**
• Predict what will come next when putting objects in order.
• Read some number words from one to ten.

**Calculating**
• Understand that adding things together or gaining more means you have a larger amount or an increase.
• Are able to say a number sentence or number story clearly while showing what it means with objects or structured apparatus.

## NPC Milestone 1

**Numbers and the Number System**
• Describe number relationships between Shapes (NPC 1:1d)

## Explorer Progress Book 1a, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 5: Sorting the Post

After completing work on Numbers and the Number System Activity 2, give children Explore More Copymaster 5: Sorting the Post to take home.

## Focus activities

**Getting Started**
1. Exploring the Numicon Display Number Line
2. Describing relationships between Numicon Shapes (essential preparatory work for Activity 3)
3. Which Shape is in the bag?

**Pattern and Algebra**
1. Repeating patterns in movement and PE

**Numbers and the Number System**
1. Making a 1–10 number line
2. Ordering numerals

**Calculating**
1. Adding more
2. Devising adding stories
3. Telling adding stories

# Securing Foundations 6: Naming number rods, investigating teen numbers and finding totals

**Key mathematical ideas**  Pattern, Ordering, Place value, Adding, Mathematical thinking and reasoning

## Educational context

The Getting Started activities on describing number relationships are continued from the previous activity group to give children time to become confident with the language for this and for teachers to work with children in groups and assess that they are able to talk about these relationships. In the Pattern and Algebra activities, number rods are used to build growing or 'staircase' patterns. As children give number names to the rods, they begin to make further connections, seeing that the rods are another illustration of numbers. Discussions about number relationships can now be extended to use number rods as well as Numicon Shapes. The Numbers and the Number System activities explore the structure of teen numbers and the relationships between them; these activities can be introduced to the whole class and followed up in group work and children's independent practice. This focus also continues through the following two activity groups because it is so important to introduce these numbers carefully since lack of understanding is often a stumbling block for many children. The work on adding with Numicon Shapes continues in the Calculating activities with the introduction of the word 'total'. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Getting Started**
• To make connections between Numicon Shapes and number ideas, e.g. by connecting Numicon Shapes, numerals and number words with positions and distances on a number line.
• To describe number relationships using the terms for children to use shown opposite.

**Pattern and Algebra**
• To recognize that the sequence of number rods 1–10 grows by one each time.
• To assign number names to the number rods 1–10.

**Numbers and the Number System**
• To learn to read and write teen numbers, 11–20.
• To build teen numbers with structured apparatus.
• To learn about relationships between numbers 1–20.
• To begin to learn to read teen numbers words 11–20.

**Calculating**
• To experience situations when it is useful to add.
• To begin to generalize and use number names as nouns, not just as adjectives.
• To understand the word 'total'.

## Terms for children to use

number names zero to twenty, pattern, next, before, after, in between, ordinal number words (e.g. first, second, third), words for comparing, set
build, put, order, next to, previous, following, growing pattern order, more, continue, numeral, count, combine, add, and, altogether, together, more, total, makes, equals

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Getting Started**
• Use patterns to predict what the next Numicon Shape in the ordered sequence might look like.
• Refer to Numicon Shapes and number rods using number names.
**Pattern and Algebra**
• Refer to the number rods using number names.
• Devise growing patterns.
**Numbers and the Number System**
• Pronounce teen numbers paying particular attention to the pronunciation of the final 'n' in 'teen'.
• Build teen numbers with Numicon Shapes.
• Read teen number names from numerals.
• Write numerals for teen numbers.
• Begin to read some teen number words.
**Calculating**
• See a total by putting Numicon Shapes together to form one larger Shape, without counting the holes.
• Are able to say a number sentence or number story while showing what it means with objects or structured apparatus.
• Are beginning to generalize and use number names as nouns, e.g. '3 and 2 make 5' and who know when to do this.

## NPC Milestone 2

**Numbers and the Number System**
• Read, say and build teen numbers from seeing numerals (NPC 1:2c)

## Explorer Progress Book 1a, pp.12–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages.
As children complete the pages, assess what progress they are making with the central ideas from the activity group.
Refer to the assessment opportunities for assistance. Children also have the opportunity to complete their Learning Log (pp. 14–15) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 6: Steps and Slides

After completing work on Numbers and the Number System Activity 3, give children Explore More Copymaster 6: Steps and Slides to take home.

## Focus activities

**Getting Started**
1. Exploring the Numicon Display Number Line
2. Describing relationships between Numicon Shapes
3. Which Shape is in the bag?

**Pattern and Algebra**
1. Growing patterns with number rods
2. Naming the number rods

**Numbers and the Number System**
1. Building and naming teen numbers with Numicon Shapes
2. Labelling teen numbers with numerals
3. Recording teen numbers with numeral cards

**Calculating**
1. Talking about the total
2. Talking about the total using Numicon Shapes

# Securing Foundations 7: More about teen numbers, number patterns, adding

**Key mathematical ideas** Pattern, Order, Counting, Place value, Grouping, Adding, Equivalence, Mathematical thinking and reasoning

## Educational context

While there are no new Getting Started focus activities in this activity group, all children will benefit from practising the Getting Started activities from Securing Foundations 1–5 until they are fully competent at naming and labelling Numicon Shapes and number rods with numerals and building the Numicon Shape patterns without counting. In the Numbers and the Number System strand, the work on teen numbers continues and includes grouping objects into teen number patterns and children completing their own 0–21 Numicon Number Line. In the Pattern and Algebra strand, a key activity is labelling repeating patterns with numerals, to prepare children for later work on algebra. Practice of earlier calculating activities should continue alongside the new adding activities using number rods. Adding with number rods helps children to begin to generalize what they have understood about adding with Numicon Shapes and to develop recall of adding number facts. For further educational context and teaching support, please see pages 36–41.

## Learning opportunities

**Pattern and Algebra**
• To realize that regular patterns can be represented with number names, numerals and structured apparatus.

**Numbers and the Number System**
• To learn about relationships between numbers 1–20.
• To group objects into Numicon Shape patterns to show numbers 1–20.

**Calculating**
• To understand that 'add' and 'and' can both mean 'combine'.
• To begin to generalize and use number names as nouns, not just as adjectives.
• To use number rods to illustrate adding.

## Terms for children to use

repeat, next, before, after, predict, shape, pattern, build, copy, continue, put, order, next to, before, after, between, previous, following, growing pattern
number words zero to twenty, ordinal number words (e.g. first, second, third), numeral, count
combine, add, and, altogether, together, more, total, makes, equals, larger amount

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Pattern and Algebra**
• Can devise symmetrical patterns.
• Record their patterns on squared paper.
• Assign numerals to their patterns.
**Numbers and the Number System**
• Pronounce teen numbers paying particular attention to the pronunciation of the final 'n' in 'teen'.
• Make Numicon Shape patterns to show numbers 1–20.
**Calculating**
• Can see a total by putting number rods together to form one larger number rod.
• Are able to say a number sentence clearly while illustrating it with objects or structured apparatus.
• Explain their practical adding with Numicon Shapes, saying,
• e.g. 'I have put a one, a three and a four together to make eight'.
• Are beginning to generalize and use the number names as nouns, e.g. 'It's 4', '3 and 2 make 5,' and who know when to do this.

## NPC Milestone 2

**Pattern and Algebra**
• Assign numbers to repeating patterns using structured apparatus and other media (NPC 1: 2b)
**Numbers and the Number System**
• Add 1-digit numbers without counting using Numicon Shapes (NPC 1: 2e)
**Calculating**
• Illustrate a one-step adding problem with objects and structured apparatus and say the number sentence (NPC 1:2f)
• Know when to add (NPC 1:2g)

## Explorer Progress Book 1a, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 7: Numeral Patterns

After completing work on Pattern and Algebra Activity 1, give children Explore More Copymaster 7: Numeral Patterns to take home.

## Focus activities

**Getting Started**
1. Exploring relationships between number, Numicon Shapes, Numicon Shape patterns and number rods

**Pattern and Algebra**
1. Representing patterns with apparatus and numerals
2. Patterns with Numicon Shapes and numerals

**Numbers and the Number System**
1. Building, naming and labelling teen numbers with Numicon Shapes
2. Grouping objects into teen number Numicon Shape patterns
3. Completing my own 0–21 number line

**Calculating**
1. Beginning to add with number rods
2. Combining rods to make a given length
3. Combining rods and finding the total length

# Securing Foundations 8: Beginning subtracting, sorting, more number patterns

**Key mathematical ideas**   Pattern, Order, Equivalence, Counting, Grouping, Subtracting, Mathematical thinking and reasoning

## Educational context

Getting Started activities should continue for any children who are not secure in giving number names to Numicon Shapes and in building and visualizing Numicon Shape patterns. The main focus this week is on subtracting – introducing the 'take away' structure in the Calculating activities – using opportunities that occur during the school day and also by telling subtracting stories. In the Pattern and Algebra activities, number pattern work continues using 1p and 2p coins and number rods.

Sorting activities are now introduced, providing opportunities for discussing similarities and differences before children meet the 'difference' subtracting structure in the Calculating strand over the coming weeks. In the Numbers and the Number System strand, the work on teen numbers is brought together as children contribute to making a class book. For further educational context and teaching support, please see pages 36–41.

## Learning opportunities

### Pattern and Algebra
• To realize that regular patterns can be represented with number names, numerals and structured apparatus.
• To build patterns using 1p or 2p coins.
• To be able to spot and say when objects are the same colour, shape or size.
• To be able to spot and talk about other attributes that allow objects to be considered 'the same'.
• To be able to compile sets according to a chosen criterion.

### Numbers and the Number System
• To read and write teen numbers, 11–20.
• To group objects into Numicon Shape patterns to show numbers 1–20.

### Calculating
• To recognize situations when it is useful to subtract.
• To be able to say a subtracting number story and illustrate it with 'objects' and structured apparatus.
• To understand subtracting as take away and decrease.
• To begin to generalize, starting to use number words as
• nouns, not just as adjectives.

## Terms for children to use

next, before, after, between, predict, previous, following, growing pattern, same, different, similar, set, because, reason, can be part of the set, cannot be part of the set, colour words, words for comparing
number words zero to twenty, ordinal number words (e.g. first, second, third), order, more, numeral, count
take away, compare, smaller amount, leaves, equals, how many more?

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Pattern and Algebra**
• Assign numerals to their own patterns.
• Build patterns with 1p and 2p coins.
• Explain why certain elements are in a given set and describe their characteristics.
**Numbers and the Number System**
• Build Numicon Shape patterns to show numbers 1–20.
• Write numerals for teen numbers.
**Calculating**
• See the value or Numicon Shape pattern left, without counting the holes, when subtracting using Numicon Shapes.
• Understand that subtracting results in a smaller amount being left compared with the starting amount.
• Are able to say a number sentence or number story clearly while illustrating it with objects or structured apparatus.
• Are beginning to generalize using number names as nouns,
• e.g. '5 take away 2 equals 3', and know when to do this.
• Know when to subtract within their daily routines and when faced with mathematical problems.

## NPC Milestone 2

**Numbers and the Number System**
• To build teen numbers using Shapes and rods and write numerals from hearing number names (NPC 1:2d)

## Explorer Progress Book 1a, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 8: Teen Number Game

After completing work on Numbers and the Number System Activity 1, give children Explore More Copymaster 8: Teen Number Game to take home.

## Focus activities

### Getting Started
1. Exploring relationships between number, Numicon Shapes, Numicon Shape patterns and number rods

### Pattern and Algebra
1. Patterns with number rods and numerals
2. Patterns with 1p and 2p coins
3. Sorting coins
4. Sorting clothing

### Numbers and the Number System
1. Making a class book about teen numbers

### Calculating
1. Exploring subtracting opportunities throughout the day
2. Taking away

# Securing Foundations 9: Sorting, more practical subtracting

**Key mathematical ideas**  Pattern, Equivalence, Subtracting, Mathematical thinking and reasoning

## Educational context

Getting Started activities should continue for any children who are not secure in giving number names to Numicon Shapes and in building and visualizing Numicon Shape patterns. The Numbers and Number System practice activity helps children consolidate their understanding of cardinal values of teen numbers. In the Pattern and Algebra strand, the main focus is sorting and finding the odd one out of a set, as children often have more difficulty finding an object that doesn't fit. You will notice that the more subtle the criteria for sorting becomes, the more sophisticated the language is for describing them. In the Calculating strand, the work on the 'take away' structure of subtracting continues and the 'decrease' structure is introduced so there is new language bringing in the words 'less' and 'fewer'. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Pattern and Algebra**
• To know that when something is not the same, it is different.
• To be able to compile sets according to a chosen criterion using set rings.
• To learn that sets can be overlapped when objects satisfy more than one sorting criterion.
**Numbers and the Number System**
• To build Numicon Shape patterns for teen numbers.
**Calculating**
• To recognize situations when it is useful to subtract.
• To understand subtracting as take away and decrease.
• To be able to say a number story and illustrate it with 'objects' and structured apparatus.
• To generalize and begin to use number words as nouns, not
• just as adjectives.

## Terms for children to use

same, different, similar, set, because, reason, can be part of the set, cannot be part of the set, odd one out, colour words take away, fewer, decrease, smaller amount, leaves, equals, pattern, smaller Shape, how many more?

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Pattern and Algebra**
• Spot an odd one out in a given set and explain why it is the odd one out.
• Are able to find another element for the set, having noticed another criterion.
• Compile their own sets and clearly say the reason for their choice.
**Numbers and the Number System**
• Build Numicon Shape patterns without counting, from the bottom up and form the 10-patterns first.
**Calculating**
• See the value or pattern left, without counting the holes, when subtracting using Numicon Shapes.
• Understand that subtracting whole numbers means you have a smaller amount or decrease.
• Are able to say a number sentence or number story clearly while showing what it means with objects or structured apparatus, e.g. 'I have 10 and I can take away 6, which leaves 4'.
• Know when to subtract within their daily routines and when faced with mathematical problems.

## NPC Milestone 2

**Pattern and Algebra**
• Compile sets according to a chosen criterion; explain why an object does not fit the set (NPC 1:2a)

## Explorer Progress Book 1a, pp. 20–21

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 9: Odd One Out

After completing work on Pattern and Algebra Activity 2, give children Explore More Copymaster 9: Odd One Out to take home.

## Focus activities

**Pattern and Algebra**
1. Finding the odd one out
2. Sorting musical instruments
3. Showing data in set rings
4. Sorting in the classroom

**Calculating**
1. Taking away a Numicon Shape pattern
2. Looking at decrease
3. Telling subtracting stories

# Securing Foundations 10: Comparing lengths and weights, more subtracting

**Key mathematical ideas**   Pattern, Order, Subtracting, Mathematical thinking and reasoning

## Educational context

Continue to provide opportunities for further practice of Getting Started and Numbers and the Number System activities for children who you assess need this. In the Calculating activities, work on 'decrease' and 'take away' structures continues and the focus is extended further to introduce the 'difference' structure of subtracting. Children can see the numerical difference illustrated as they compare two different-sized Numicon Shapes or number rods. The work on these three subtracting structures will help children to recognize the language used in different subtracting situations before they meet the '–' symbol, which is used in all subtracting number sentences. The work in the Pattern and Algebra strand in this activity group focuses on reasoning as children compare lengths and weights of objects and learn to use comparative language that they need for their later work on measures. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Pattern and Algebra**
• To realize that when we make direct comparisons between two objects, we can use what we know about one object to find out information about the other.
• To compare objects directly by length and weight.

**Numbers and the Number System**
• To consolidate Numicon Shape patterns for numbers 11–20.
• To read some number words from eleven to twenty.

**Calculating**
• To recognize situations when it is useful to subtract.
• To understand subtracting as take away, decrease and difference.
• To generalize and begin to use number words as nouns, not
• just as adjectives.

## Terms for children to use

compare, long, longer, longest, short, shorter, shortest, wide, wider, widest, narrow, narrower, narrowest, heavy, heavier, heaviest, light, lighter, lightest, 'I know that … so I also know that … .'
take away, fewer, difference, decrease, compare, comparison, smaller amount, leaves, equals, pattern, smaller rod, how many more?

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Pattern and Algebra**
• Describe comparisons and make the inference 'I know that … so I also know that … .'
• Make accurate comparisons.
**Numbers and the Number System**
• Accurately build Numicon Shape patterns for numbers 11–20.
• Read some number words from eleven to twenty.
**Calculating**
• See the value or pattern left, without counting the holes, when subtracting using Numicon Shapes.
• Are beginning to generalize and use the number names as nouns in their number sentences, e.g. calling a 5-rod 'five'.
• Know when to subtract within their daily routines and when faced with mathematical problems.
• Show understanding of the term 'difference between' when working with Shapes or number rods.

## NPC Milestone 3

**Calculating**
• Illustrate a subtracting story with objects and structured apparatus and say the number sentence (NPC 1:3a)
• Know when to subtract (NPC 1:3b)

## Explorer Progress Book 1a, pp. 22–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 10: How Many Left?

After completing work on Calculating Activity 1, give children Explore More Copymaster 10: How Many Left? to take home.

## Focus activities

**Numbers and the Number System**
1. Grouping objects into teen Numicon Patterns
**Pattern and Algebra**
1. Comparing lengths and widths of ribbons
2. Comparing weights of book bags
3. Comparing weights of balls of modelling dough
**Calculating**
1. What is the same and what is different?
2. Finding the difference
3. Finding the difference with rods

# Securing Foundations 11: Counting and adding

**Key mathematical ideas**   Counting, Adding, Commutative property, Mathematical thinking and reasoning

## Educational context

The Numbers and the Number System activity provides opportunities to check that children have secured one- to- one counting to at least 30 and that they understand how grouping objects into Numicon Shape patterns is an efficient way of finding 'how many?' The Calculating work extends the earlier work on adding, with activities to help children consolidate the language for describing the adding operation. In these adding activities, children are setting out number sentences using Numicon Shapes and word cards saying 'and', 'add', 'plus', 'equals' to prepare them for meeting the '+' symbol in Securing Foundations 12. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Numbers and the Number System**
• To consolidate one-to-one counting to 31.
**Calculating**
• To understand the operation of adding through solving problems.
• To consolidate understanding and use of the language of adding.
• To add whole numbers without counting, using Numicon Shapes.
• To begin to understand that adding can be done in any order.
• To use and read the words 'and', 'add', 'plus', 'makes' and 'equals' in adding sentences.

## Terms for children to use

number names one to thirty-one, ordinal number words (e.g. first, second, third), growing pattern, growing sequence, order, next, numeral, count
add, and, plus, makes, equals, altogether, together, total, more, larger Shape, larger amount, adding, adding sentence, adding story

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Numbers and the Number System**
• Accurately build Numicon Shape patterns for numbers up to 31.
**Calculating**
• Combine two or more Numicon Shapes and say the total without counting.
• Use Numicon Shapes in different positions to make a total, e.g. 5 and 3 or 3 and 5.
• Explain what they have done in whole-number adding sentences, e.g. 'I have put a 1, a 3 and a 4 together to make 8'. Some children may use the word 'equals'.
• Know when to use their knowledge that numbers can be added in any order.
• Know when to add within their daily routines and how to solve mathematical word problems involving adding.

## NPC Milestone 3

**Numbers and the Number System**
• Use number words as nouns, not just as adjectives e.g. talk
• about 'five', not just 'five cars', 'five books' or 'five sweets' (NPC 1:3c)

## Explorer Progress Book 1a, pp. 24–25

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 11: Adding Sentences

After completing work on Calculating Activity 4, give children Explore More Copymaster 11: Adding Sentences to take home.

## Focus activities

**Numbers and the Number System**
1. Counting how many 1p coins
**Calculating**
1. How many children in the play park?
2. Adding stories with 'more'
3. Introducing word cards for calculating
4. Reading adding sentences and finding apparatus
5. Reading adding sentences and making up adding stories
6. A different order for an adding sentence

# Securing Foundations 12: Similar attributes, numbers to 20 and the '+' symbol

**Key mathematical ideas**   Equivalence, Order, Counting, Grouping, Adding, Mathematical thinking and reasoning

## Educational context

In the Calculating activities, children go for a walk to look for symbols in the environment and notice that symbols tell us something. The '+' symbol is introduced alongside the Numicon adding action. Familiar adding activities are revisited using '+', providing important practice to help children begin to memorize adding facts to 10. The Pattern and Algebra activities extend earlier work on sorting and reasoning to focus on exploring similar attributes. In the Numbers and the Number System activities, children are consolidating their ability to build numbers to 20 with structured apparatus, to say the number names and label them with numerals. Children also have the opportunity to read and write numerals for these numbers, establishing a secure basis of understanding before they move on to work on higher numbers. For further educational context and teaching support please see pages 36–41.

## Learning opportunities

**Pattern and Algebra**
• To be able to spot and say when something is the same colour, shape or size.
• To be able to spot and talk about other attributes that allow something to be considered 'the same'.
**Numbers and the Number System**
• To label Numicon Shapes for 0–20 with numerals.
• To learn to write numerals for 0–20 correctly and in order.
• To read some number words from 0–20.
**Calculating**
• To use and read the words 'and', 'add', 'plus', 'makes' and 'equals' in adding sentences.
• To recognize and use the adding symbol, '+'.

## Terms for children to use

same, equivalent, different, similar, set, because, reason, odd one out, thick, thin, long, short, wide, narrow, big, small, colour words
number names zero to twenty and beyond, ordinal number words (e.g. first, second, third), growing pattern, growing sequence, order, more, continue, next, numeral, count, between
add, and, plus, makes, equals, altogether, together, total, more, larger Shape, larger amount, adding, adding sentence, adding story

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
**Pattern and Algebra**
• Explain that if something is similar, some aspect of it is equivalent.
**Numbers and the Number System**
• Build numbers 0–20 with structured apparatus and write the numerals for each number
• Read numerals 0–20 and write them in response to hearing the spoken number name.
• Read some number words 0–20 and write the corresponding numerals.
**Calculating**
• Build and read adding sentences with Numicon Shapes, numeral cards, word cards and symbol cards.
• Recognize and know when to use the adding symbol, '+'.

## NPC Milestone 3

**Calculating**
• Build and read adding sentences with Numicon Shapes, numeral, word and symbol ('+') cards (NPC 1:3d)

## Explorer Progress Book 1a, pp. 26–29

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 28–29) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 12: Adding Pairs

After completing work on Calculating Activity 2, give children Explore More Copymaster 12: Adding Pairs to take home.

## Focus activities

**Pattern and Algebra**
1. Playing the attribute game
**Numbers and the Number System**
1. Labelling Numicon Shapes 1–20 with numerals
**Calculating**
1. Going on an outdoor symbol-spotting walk
2. Introducing the '+' symbol and action
3. Turn it over – a game using adding facts

# Pattern and Algebra 1: Preparing for equivalence and using the '=' symbol

**Key mathematical ideas**   Comparing different numbers, Equivalence, Mathematical thinking and reasoning

## Educational context

This activity group addresses comparing numbers and showing these comparisons using the '>' and '<' symbols. It continues work on comparing and ordering from earlier Pattern and Algebra and Numbers and the Number System activities in the Securing Foundations section. It calls on children's growing understanding of cardinal number values and their work on greater than (>) and less than (<) to introduce the idea of equal value and the symbol '='.

The idea of equal value – even though the values may be represented differently – is fundamental to children's later mathematics. It is therefore essential that children have a secure understanding of the ideas they meet in this activity group. Care should be taken to avoid children thinking that the '=' symbol is an instruction to write an answer.

## Learning opportunities

• To use the language of comparison in conversation.
• To understand that 'equals' means the same value.
• To understand and use the '=' symbol.

## Terms for children to use

more, less, fewer, is greater than, is smaller than, the same, the same amount as, different amount, balances, equals

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Use the language of comparison in their conversations.
• Know when they have 'more' or 'less' and can give 'more' or 'less' in practical situations.
• Know that 'equals' means 'the same value'.
• Know that there needs to be the same value on both 'sides' of the '=' symbol, when it is used.

## NPC Milestone 4

• Understand and use the language more than/less than/fewer than, most/least/fewest, equal to (NPC 1:4a)
• Use '<' and '>' to compare objects, structured apparatus and numbers (NPC 1:4b)

## Explorer Progress Book 1b, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 13: Comparing Shapes

After completing work on Activity 4, give children Explore More Copymaster 13: Comparing Shapes to take home.

## Focus activities

1. Comparing heights and introducing the '<' and '>' symbols
2. Comparing Numicon Shapes using the '<' and '>' symbols
3. Comparing number rods using the '<' and '>' symbols
4. More/less/the same quantity
5. Finding equivalent number rods
6. Comparing Numicon Shapes and number rods using a Pan Balance
7. Introducing the term 'balances'
8. Introducing the '=' symbol

# Calculating 1: Introducing the subtracting symbol

**Key mathematical ideas**  Subtracting, Mathematical thinking and reasoning

## Educational context

This activity group provides opportunities for children to talk about practical subtracting problems and to find solutions, building on their previous subtracting experience. They will also build on their experience of recording. Previously, in the Securing Foundations section, children have used adding words and the adding symbol, equals and the symbol of equivalence '=' in their recording work. Now they will use subtracting words and the subtracting symbol. When secure with recording using word cards, they are introduced to the '−' symbol.

If children are not confident at recording their work in writing, they may still use the numeral and symbol cards for calculating to enable them to succeed with their mathematics. Paired work to practise recording with numeral and word cards can be repeated using numeral and symbol cards, and with writing.

The 'Turn it over' game (from Securing Foundations 12, Activity 3) has been adapted for subtracting, allowing children to work strategically, reasoning about which numbers to use in a subtracting sentence to get a particular result.

## Learning opportunities

• To understand the operation of subtracting through solving problems.
• To consolidate understanding and use of the language of subtracting.
• To subtract whole numbers without counting, using Numicon Shapes.
• To use and read the words 'take away', 'subtract' and 'minus' as well as 'equals' in subtracting sentences.
• To recognize and use the subtracting symbol, '−−', and to continue to use the '=' symbol.

## Terms for children to use

take away, fewer, subtract, minus, difference, smaller amount, equals, pattern, smaller Shape, subtracting, subtracting sentence, subtracting story

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Cover the holes on Numicon Shapes to show taking away and say how much is left by looking at the Numicon Shape pattern, without counting.
• Explain what they have done in whole number subtracting sentences, e.g. 'I had 6 and I took away 2, so I have 4 left.' Some children may use the word 'equals': encourage this.
• Build and read subtracting sentences with Numicon Shapes, numeral cards and symbol cards.
• Show with actions and words what the subtracting sentence means.
• Recognize and know when to use the subtracting symbol, '−'.
• Know when to subtract within their daily routines and how to solve mathematical word problems involving subtracting.

## NPC Milestone 4

• Understand and use the '=' symbol in different number sentences, e.g. 10 = 3 + 7; 7 = 10 − 3 (NPC 1:4c)

## Explorer Progress Book 1b, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 22: Subtracting Shapes

After completing work on Activity 5, give children Explore More Copymaster 22: Subtracting Shapes to take home.

## Focus activities

1. [How many children left in the play park?](#)
2. [Introducing the written words 'take away' in subtracting sentences](#)
3. [Reading subtracting sentences and finding apparatus](#)
4. [Introducing 'subtract' and 'minus' in subtracting sentences](#)
5. [Introducing the '−' symbol and action](#)
6. [Turn it over – a game using subtracting facts](#)

# Numbers and the Number System 1: Ordering numbers to 20

**Key mathematical ideas**   Counting, Place value, Grouping, Mathematical thinking and reasoning

## Educational context

This activity group is designed to consolidate and extend children's earlier work on counting and teen numbers with the use of number rods to represent numbers to 20. The activities include building, ordering, naming and labelling teen numbers to encourage understanding of the structure of teen numbers and relationships between them. Secure understanding of these number relationships lays an important foundation for children's understanding of the number system, learning the extended counting sequence and calculating within 20 and beyond. Listen for children making the common error of describing eleven as 'one and one'. Correct this by discussing what the first '1' represents; address both 'quantity value' and 'column value' by modelling the phrases 'ten and one' and 'one ten and one' respectively. The quantity value of the first '1' in '11' is '10'; and its column value is '1 ten'. It is important for children to understand that these column and quantity values are equivalent.

## Learning opportunities

• To consolidate understanding of the structure of the numbers 1–20 and to show this understanding with structured apparatus.
• To learn the sequence of number names from one to twenty and to recognize and write numerals for these.
• To learn to write numerals for 0–20 correctly and in order.
• To continue to learn to read number words one to twenty.
• To know that the numerals for numbers 0–20 can be ordered in different ways.
• To understand the rules and behaviour for playing board games.
• To understand why it is sometimes important to follow instructions in order.

## Terms for children to use

number names one to twenty and beyond, ordinal number words (e.g. first, second, third), growing pattern, growing sequence, order, more, continue, next, numeral, count, between

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Say the counting sequence from 0–20 correctly, in order.
• Write the numerals for numbers 0–20 correctly, in order.
• Show numbers from 1–20 in order with structured apparatus.
• Explain and follow the rules for playing board games.
• Build teen numbers with number rods.

## NPC Milestone 4

• Order numerals 0–20 (NPC 1:4f)

## Explorer Progress Book 1b, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 18: Race to 20

After completing work on Activity 4, give children Explore More Copymaster 18: Race to 20 to take home.

## Focus activities

1. Looking at number tracks
2. Making a board game
3. Building and naming numbers 1–20 with number rods
4. Labelling numbers to 20 with numerals using number rods
5. Looking for numerals in order
6. Following instructions in order

# Calculating 2: Adding and subtracting 1 and 2

**Key mathematical ideas**   Adding, Subtracting, Pattern, Mathematical thinking and reasoning

## Educational context

This activity group gives children the opportunity to explore relationships and patterns in adding and subtracting within numbers to 10, and looks at the 'decrease' structure for subtraction. It builds on children's earlier work with '1 more' and '1 fewer' and gives children the opportunity to begin to make generalizations about the increase and decrease of numbers in our number system. These ideas should be referred to whenever possible within daily routines and everyday situations.

Children record their own patterns on paper, to help them begin to move from concrete examples towards more abstract reasoning. Labelling patterns with numerals connects the patterns children can see with those that are just emerging. This is an important step in the development of their mathematical thinking.

## Learning opportunities

• To understand that adding 1 to a whole number equals the next number and that subtracting 1 from a whole number equals the number before.
• To begin to understand that when 2 is added to a whole number the result is the next number but 1 and that subtracting 2 from a whole number equals the number before, less 1.
• To begin to understand that it is helpful to look for patterns, and that it is easier to spot them when work is organized systematically.
• To begin to look for patterns in a systematic way.

## Terms for children to use

one more, two more, next, the same, equals, after, one fewer/one less, two fewer/two less, before, pattern, add, plus, total, more, compare, subtract, take away, minus, difference, systematic, always, because

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are able to continue to work in a systematic way once they have been shown how to begin.
• Can organize their work and be systematic, e.g. by doing tasks in order to show what happens, when adding 1 or 2 or subtracting 1 or 2 from a sequence of numbers, when using structured apparatus.
• Make a general statement when they have noticed something always happening.

## NPC Milestone 4

• Recognize patterns and explain regularities that they notice in patterns (NPC 1:4e)
• Subtract without counting using Numicon Shapes (NPC 1:4g)
• Build and read subtracting sentences with Numicon Shapes, numeral, word and symbol cards (NPC 1:4h)

## Explorer Progress Book 1b, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 23: Number Picnic

After completing work on Activity 7, give children Explore More Copymaster 23: Number Picnic to take home.

## Focus activities

1. Using apparatus to add 1
2. Looking at the written pattern when adding 1
3. Using apparatus to subtract 1
4. Looking at the written pattern when subtracting 1
5. Using apparatus to add 2 more
6. Adding along the number line
7. Using apparatus to subtract 2

# Geometry 1: Recognizing and naming 2D shapes

**Key mathematical ideas**  Sorting, Describing parts and properties of shapes invariant under transformations

## Educational context

In this activity group children investigate flat (2D) shapes formed with straight lines or regular curves – principally circles, triangles, oblongs and squares. This follows on from early experiences of pattern and sorting, comparing and ordering (which children may have experienced in the Securing Foundations section of the Number, Pattern and Calculating 1 Teaching Resource Handbook). Through actively playing with, handling, making and comparing a range of examples, children find out about what happens as shapes slide or are flipped, turned or resized – that is, about the effect of the 'transformations' of translation, reflection, rotation or scaling. With practical experience they begin to recognize which parts of shapes (such as corners and sides) and which of their properties (such as the angles at which sides meet) do not change under transformation. As a result, they are able to sort and discriminate between shapes in a practical, intuitive way. Through describing and discussing what they see and do, children begin to reason about, name and define categories. Names and terms conventionally used in geometry are then introduced, as they become useful for describing and sorting, and children's definitions for them are explored and refined.

Initially children are likely to sort, distinguish and name shapes without being able to explain their choices clearly. They may find it more difficult to form the mental categories of triangles and oblongs than circles and squares, since there is more variety among these shapes. Encourage children to talk freely and informally about what they are doing; prompt them to generalize with 'What if … ?' questions, and to access the consistency behind the use of conventional shape names and categories with 'Why … ?' questions. The activity group also introduces the category 'rectangles' as including both oblongs and squares. This is an early opportunity for children to relate categories to each other and to begin classifying shapes. Allow children plenty of time to investigate, think about and discuss this idea, so that they can address the potentially confusing issue of the word 'rectangle' being used in everyday language to mean only oblongs.

## Learning opportunities

• To become familiar with squares, oblongs, triangles and circles.
• To create mental images of a square, oblong, triangle and circle.
• To group shapes according to their parts and properties.
• To confidently and accurately describe the properties of squares and oblongs.
• To recognize and name squares, oblongs, triangles and circles appearing in everyday objects and images.
• To recognize squares, oblongs, triangles and circles in different positions, sizes or orientations.
• To spot the similarities between squares and oblongs compared to a variety of other shapes.

## Terms for children to use

square, oblong, triangle, circle, small, smaller than, smallest, big, bigger than, biggest, long, longer, short, shorter, straight, flat, curved, round, lines, sides, corners, move up, turn round, rectangle
• Identify a shape based on its number of sides and corners.
• Identify shapes that have square corners and classify them as rectangles.

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Understand that certain parts and properties of shapes, e.g. number of corners, relative length of sides, are not dependent on the size of the shape.
• Describe everyday objects using the names of common flat geometric shapes.
• Identify and name squares, oblongs and triangles in different orientations.

## GMS Milestone 1

• Identify squares, oblongs, triangles and circles in flat geometric shapes and the everyday environment (GMS 1:1a)
• Use the language of parts and properties, e.g. corners and sides, to show and describe how shapes can be grouped (GMS 1:1b)
• Understand that differences in size, position and orientation will not change the names of 2D shapes (GMS 1:1c)

## Explorer Progress Book 1, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 1: Making Shapes and Patterns

After completing work on Activity 1, give children Explore More Copymaster 1: Making Shapes and Patterns to take home.

## Focus activities

1. Exploring flat geometric shapes and patterns
2. Making large shapes from smaller ones
3. Recognizing common 2D shapes
4. Categorizing squares and oblongs as rectangles
5. Sorting and classifying common 2D shapes

# Measurement 1: Comparing, ordering and measuring lengths

**Key mathematical ideas**    Length and distance, Comparing, Ordering, Non-standard units

## Educational context

In this activity group children compare, order and measure lengths in a variety of practical situations. The contexts are varied, but in each case the measurement task has a problem-solving purpose, whether escaping from a castle in a story, delivering greetings cards or building bridges across a river. Children begin by investigating how to compare and order lengths, and encounter the importance of making comparisons based on a common starting point and keeping lengths 'straight'. They consider terms used to refer to length (or, more precisely, 'linear extension') in different everyday contexts – such as 'length', 'width', 'height', 'depth' and 'distance' – as well as the variety of comparative language that can be used to describe these different dimensions. Finally, they are introduced to using non-standard units of length in a context in which there is a clear need to communicate measurements in a common language.

Throughout the activities, allow children time to experiment, prompting them as needed to recognize problems of judging and measuring length, and to solve these problems appropriately. Encourage them to talk in detail about what they see and do, asking them questions which invite them to use comparative language ('What can you say about … ?') and to explain the reasons for what they are doing ('Why … ?').

## Learning opportunities

• To use a range of vocabulary to describe length.
• To compare two or more lengths and describe one as, e.g. longer or shorter, wider or narrower, taller or shorter.
• To order lengths from shortest to longest and vice versa.
• To choose and use suitable objects to measure length.
• To realize that when measuring length by lining up or linking objects, all the objects should be the same length.

## Terms for children to use

length, width, tall, long, longer, longest, short, shorter, shortest, wider, narrower, compare, same, different, distance, height

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Recognize that the difference in length between two objects can be shown by aligning them to the same starting point.
• Order two or more objects of the same type by length.
• Make a reasonable judgement as to whether one length is shorter than, equal to or longer than another, e.g. whether an object will fit into a particular space.
• Choose appropriate and consistent non-standard units for measuring length.
• Measure length in non-standard units, recognizing some factors affecting accuracy, e.g. whether the measurement is in a straight line.

## GMS Milestone 1

• Compare and order objects of different lengths by aligning them to the same starting point (GMS 1:1d)
• Choose appropriate non-standard units for measuring different lengths of up to 1 m (GMS 1:1e)
• Demonstrate and explain the need for accuracy when measuring using non-standard units (GMS 1:1f)

## Explorer Progress Book 1, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 6: Longer or Shorter?

After completing work on Activity 1, give children Explore More Copymaster 6: Longer or Shorter? to take home.

## Focus activities

1. Comparing lengths
2. Identifying and comparing length and width
3. Measuring distance using non-standard units

# Measurement 2: Introducing the 1p, 2p, 5p and 10p coins

**Key mathematical ideas**    Money, Equivalence

## Educational context

In this activity group children encounter the idea of how much something is 'worth' in the context of trading in markets or shops, and are introduced to money as an agreed measure of this worth. This broad introduction can be used to encourage children to recall related contexts and language from their own experience, and to begin to think about what money is. You could talk with them, for example, about buying and selling, value and price, bargaining and fairness.

The 1p and 2p, 5p and 10p coins are introduced and children make a thorough investigation of their relative values, using structured apparatus as needed to total amounts up to 20p and explore equivalences. They reason systematically to work out how to pay with the fewest coins, or to find all the possible ways of paying. Following this work, in the *Number, Pattern and Calculating 1 Teaching Resource Handbook* there are opportunities to build on this learning in areas such as number facts, equivalence, and doubling and halving (covered, for instance, in Calculating 3 and 6, and Pattern and Algebra 2).

## Learning opportunities

• To consider the value and worth of given items by trading them.
• To understand buying as exchanging money for items.
• To recognize a variety of coins.
• To understand the value of 1p, 2p, 5p and 10p coins.
• To be able to make different amounts of money using one or more types of coin.

## Terms for children to use

trade, swap, exchange, worth, fair, money, pence (p), coin, coins, penny, pennies, one, two, five, ten, twenty, fifty, more, less, fewer, make, spend, spent, price, cost, buy, bought, sold, sell, pay, bronze, silver

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Sort and identify coins correctly.
• Know the relative value of 1p, 2p, 5p and 10p coins.
• Make amounts up to 20p using a variety of coins.
• Find all possible combinations of coins for an amount from 5p to 20p.
• Give the correct amount of money up to 20p when buying an item using 1p, 2p, 5p and 10p coins.
• Make any amount of money, up to 20p, in the smallest number of coins possible.

## GMS Milestone 1

• Recognize 1p, 2p, 5p and 10p coins and show the relative values using Numicon Shapes (GMS 1:1g)
• Make an amount of money from different combinations of coins, e.g. 12p (GMS 1:1h)

## Explorer Progress Book 1, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 7: Collecting Coins

After completing work on Activity 2, give children Explore More Copymaster 7: Collecting Coins to take home.

## Focus activities

1. Understanding value and exchange
2. Introducing the 1p and 2p coins and talking about pennies and pence
3. Adding with 1p and 2p coins
4. Introducing 5p and 10p coins
5. Selecting the fewest coins and investigating equivalence

# Calculating 3: Money

**Key mathematical ideas** Money, Adding, Subtracting, Pattern, Mathematical thinking and reasoning

## Educational context

This activity group builds on children's recognition of coins, understanding of the one-to-one correspondence between one pence coins and counting, and the idea of equivalence. It also builds on their previous experience of adding and develops this in situations where money values need to be added together, always maintaining the adding of 'whole' amounts – not counting in ones – by relating them to the Numicon Shapes. For some children, sticking coins onto the Numicon Shapes can help them to make the connection between the coin and its value. This activity group continues to develop fluency with adding facts to 10. Since children have not looked closely at the 'how many more?' structure of subtraction, subtracting is between amounts of money only; giving change is developed in Calculating 6 (page 196), with a further focus on 'how many more?' for subtracting. While there are no specific references to number rods within this activity group, whenever Numicon Shapes are used, they may be substituted with number rods.

## Learning opportunities

• To understand the equivalence of coin values.
• To know when to use an equivalent value of coins.
• To develop fluency with adding facts through the use of money.
• To know when to look for patterns and to notice that it is easier to spot them when work is organized systematically.

## Terms for children to use

combine, add, plus, total, compare, equals, pattern, different, combination, coins, coin value, how much?, how many?, pence

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use in effectively in discussion.
• Begin to recognize when it is important to be well organized and to work systematically.
• Show an understanding of the equivalence of coin values.
• Use structured apparatus or whole numbers to add money values without counting in ones.
• Know when they can use an equivalent value of a different selection of coins.
• Know when they can use the commutative property of addition.

## NPC Milestone 4

• Understand the equivalence between coin values (NPC 1:4d)

## Explorer Progress Book 1b, pp. 10–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance. Children will also have the opportunity to complete their Learning Log (pp. 12– 13) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 24: Counting Money

After completing work on Activity 4, give children Explore More Copymaster 24: Counting Money to take home.

## Focus activities

1. Paying for items using 1p and 2p coins
2. Which purse holds the most money?
3. How much is in the purse?
4. Shopping for two items
5. Adding another amount to 10p
6. Using '<' and '>' with amounts of money
7. Making amounts equal
8. Subtracting amounts of money
9. Mystery coins

# Numbers and the Number System 2: Finding how many by grouping

**Key mathematical ideas**  Counting, Place value, Grouping, Mathematical thinking and reasoning

## Educational context

This activity group uses children's skill in building the patterns for Numicon Shapes to establish firmly the understanding that grouping is a more efficient way to find out 'how many?' than counting in ones or in small groups such as twos or fives. The two focus activities are based on meaningful problems so that children learn why it is important to work accurately and when to use grouping. These activities encourage understanding of the structure of numbers, and should be repeated often, with different numbers, in order to lay a strong foundation for children's later work on place value. The activities will help children develop a 'feel' for the cardinal values of numbers to 100, so that they are able to order them and begin to understand relationships between them.

When children are secure, and can group large numbers of counters into 10s quickly and accurately, the challenge in these activities can be extended by working with higher numbers. Children have not yet been introduced to the term 'multiples'. As a result, multiples of ten are called 'tens numbers' throughout Number, Pattern and Calculating 1.

## Learning opportunities

• To reinforce understanding that grouping objects into 10-patterns without counting is a quick and efficient way to find out 'how many?'
• To extend children's counting range and to help them understand that there is a pattern in the way we name numbers.
• To realize that the structure of a number helps us to know
• where on the number line to start looking for that number.

## Terms for children to use

count, how many, number names to 100, check, estimate, tens, ones, group, pattern, numeral, number line

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Know which part of the number line to go to when looking for a number.
• Group objects into Numicon Shape patterns, without counting, to find the total amount.
• Having arranged counters, can say how many tens there are from looking at the patterns.
• Make a sensible estimate.
• Find tens numbers on the number line.
• Answer 'how many?' in response to seeing up to 100 objects grouped into Numicon Shape patterns.

## NPC Milestone 5

• Start to organize adding and subtracting facts systematically with structured apparatus and number sentences (NPC 1:5a)
• Explain the pattern of naming numbers, know where to find a number on a number line (NPC 1:5b)
• Say 'how many?', without counting in ones, by looking at objects grouped in Numicon 10-patterns (NPC 1:5c)
• Make a sensible estimate (NPC 1:5d)

## Explorer Progress Book 1b, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 19: Star Spotting

After completing work on Activity 1, give children Explore More Copymaster 19: Star Spotting to take home.

## Focus activities

1. Finding 'how many?' by grouping objects
2. Finding 'how many?' by grouping counters

# Measurement 3: Units of time

**Key mathematical ideas**   Duration, Ordering, Standard units

## Educational context

The activities in this group involve children in exploring the idea of time duration, including ideas of linear time and repeating cycles, as well as different standard units and scales of time, from seconds, minutes and hours to days, weeks and months. They approach these ideas through meaningful, practical contexts, beginning by ordering the day's events on a simple timeline, then matching the days of the week with familiar weekly events and months of the year with seasons and birthdays, arranging related representations and resources to show the cycles involved. They consider hours, minutes and seconds in terms of 'how long' events or activities take, and begin to estimate and measure this for themselves.

Unlike length, mass or capacity, time cannot be experienced directly through handling or observing objects in physical space, and it is measured in units which cannot be sensed directly (and which may seem to us to pass more quickly or slowly depending on the circumstances). Throughout this work, encourage children to explore fully the illustrative resources, instruments and activities, and prompt plenty of discussion to encourage them actively to develop their personal understanding of time.

## Learning opportunities

• To understand the passage of time during a day through creating a timeline.
• To order events in the day.
• To name and sequence days of the week
• To name and sequence months of the year.
• To record time in seconds and minutes.
• To order times from shortest to longest and longest to shortest.
• To begin to understand how long an hour, second and minute are.

## Terms for children to use

day, week, weekend, yesterday, today, tomorrow, month, year, date, fast, faster, fastest, slow, slower, slowest, timer, less time, more time, hour, minute, second, before, after, later, next

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Recognize and use the days of the week in conversation.
• Recognize the months of the year and begin ordering them.
• Sequence events accurately, e.g. days, weeks, months.
• Select an appropriate unit of time to measure an event in hours, minutes or seconds.
• Use a sand timer to record duration in minutes.
• Count in seconds to record approximate durations in seconds.
• Estimate the duration of an event in seconds and minutes and refine their estimate.
• Compare time durations in minutes, hours or seconds and order them from slowest to fastest and vice versa.

## GMS Milestone 1

• Sequence events over the course of a day or week, in chronological order (GMS 1:1i)
• Recall names of days of the week and months of the year and begin to put them in order (GMS 1:1j)
• Consider how long activities may take, e.g. hours, minutes or seconds; and use suitable equipment to time activities in minutes or seconds (GMS 1:1k)

## Explorer Progress Book 1, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 8: Just a Minute!

After completing work on Activity 4, give children Explore More Copymaster 8: Just a Minute! to take home.

## Focus activities

1. Creating a timeline for today
2. Days of the week and weekends
3. Sequencing months and birthdays
4. Introducing hours and minutes
5. Introducing seconds

# Geometry 2: Making pictures, shapes and patterns

**Key mathematical ideas**  Using parts and properties of shapes, Transforming and combining shapes, Equivalence

## Educational context

This activity group addresses the use of shape in pattern through investigating and problem-solving with 2D pictures, shapes, patterned designs, tilings and sequences. This expands on work on pattern, ordering and sequencing covered in the Securing Foundations section of the *Number, Pattern and Calculating 1 Teaching Resource Handbook*. The activities call on children's growing understanding of geometrical invariants – shape parts (such as corners and sides) and properties (such as angle sizes and side lengths) which do not change under transformation – by challenging them to work out how to reposition, turn and flip (that is, translate, rotate and reflect) shapes so that they fit together to make larger shapes or tiling patterns. As their geometrical reasoning develops, children will begin to predict which shapes will 'work' and what the finished patterns will look like. Making larger shapes in a variety of ways and creating sequences involving shapes introduces children to important equivalence relations in geometry, laying the foundations for their later understanding of geometrical concepts such as congruence and similarity, equivalent transformations, and the relationship between internal angles and tessellation. Use patterns and shape in everyday design – in fabric, clothing, wallpaper, wrapping paper, garden paths, pavements, and so on – to illustrate this work. Encourage children to notice, think and talk about how shapes are used in their surroundings.

## Learning opportunities

- To copy and create pictures, shapes and patterns.
- To understand that a shape can be made up of different smaller shapes, organized in different ways.
- To notice that some shapes are better than others for making certain shapes or patterns due to their particular parts and properties.
- To copy, continue and create repeating, tiling and growing patterns.
- To predict and test what comes next in a sequence of shapes.

## Terms for children to use

square, triangle, rectangle, shape, pattern, corner, side, size, big, large, bigger, larger, biggest, largest, small, smaller, smallest, long, longer, short, shorter, straight, curved, round, next to, on top of, under, above, between, left, right, top, middle, bottom, slide, turn, flip, compare, match, identical, repeat, repeating, tiling, growing, continue

## Assessment opportunities

Look and listen for children who:
- Use the terms for children to use effectively.
- Recognize and name oblongs, squares, triangles and circles.
- Turn, move and position apparatus accurately to make a shape, picture or pattern.
- Identify shapes regardless of orientation.
- Use their knowledge of shape parts and properties to explain why it is possible to make certain shapes or patterns with some pattern blocks but not others.
- Find all possible ways of making certain regular shapes using pattern blocks.
- Copy, continue, reorganize and create patterns.
- Predict which shape is next in a given sequence.
- Approach a problem systematically.

## GMS Milestone 2

- Devise pictures and patterns using 2D shape equipment, including shapes that fit together with no gaps (GMS 1:2a)
- Copy and build sequences to show which 2D shapes come next in a given repeating pattern (GMS 1:2b)

## Explorer Progress Book 1, pp. 10–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance. Children will also have the opportunity to complete their Learning Log (pp. 12–13) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 2: Tiling Patterns

After completing work on Activity 4, give children Explore More Copymaster 2: Tiling Patterns to take home.

## Focus activities

1. Making pictures and patterns with apparatus
2. Making squares and oblongs with pattern blocks
3. Making equilateral triangles with pattern blocks
4. Making tiling patterns with one type of pattern block
5. Repeating patterns with more than one pattern block
6. Making growing sequences with pattern blocks

# Calculating 4: Exploring adding and subtracting facts to 10

**Key mathematical ideas**   Adding, Subtracting, Pattern, Inverse, Mathematical thinking and reasoning

## Educational context

As they work on this activity group, children make some important steps towards developing fluency. The activities begin by looking at zero when adding and subtracting so children experience that, if zero is added or subtracted, it just leaves everything as it was. The activities move on to exploring the adding and subtracting facts for all numbers to 10 (in random order, since numbers do not come up in order in everyday life). At this stage, the emphasis is very much on exploring and making discoveries, rather than finding all combinations for any number independently. However through exploring and organizing adding facts and relating adding to subtracting, children will start to build a repertoire of known facts. In all the activities, children are encouraged to notice the triadic (three-way) associations between numbers (e.g. 4 + 2 = 6,  6 − 2 = 4, 6 − 4 = 2) and to explain these relationships in their own way. This provides opportunities for them to begin to notice the inverse relationship between adding and subtracting, although at this stage it is not taught explicitly. The activities continue with revising doubling numbers 1–5 and how knowing 'double facts' can help with related calculations. Near doubles are also explored. Children should always be encouraged to make up their own number stories relating to the problems. The activities will provide assessment opportunities related to perseverance, understanding and systematic ways of working, as well as the extent to which children are able to recall known facts. As these facts are such an important foundation for children's ongoing calculating, the whole-class focus on each number may last several days; and numbers may be revisited for those children who are insecure. There are limited independent practice suggestions as we recommend giving children practice for each number using the ideas from another number, especially those using the Pan Balance, the Post Box and the Parts and Wholes photocopy master. Exploring all the numbers with both number rods and Numicon Shapes gives further important practice.

## Learning opportunities

• To understand what happens when zero is added or subtracted.
• To become fluent with adding and subtracting facts for numbers to 10 and to recognize that these can be useful in many different situations.
• To recall doubles of numbers 1–5 and recognize that these can be useful when faced with related calculations.
• To experience situations when it is useful to use adding and subtracting facts for numbers to 10.
• To know when to look for patterns and that it is easier to spot them when work is organized systematically.
• To begin to see when to use the inverse relationship between adding and subtracting to solve problems.

## Terms for children to use

combine, add, plus, total, compare, subtract, take away, minus, difference, equals, facts, pattern, similar, different, combination, organize, systematic, how many ways?

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Understand what happens when zero is added or subtracted.
• Recognize when it is important to be well-organized and to work systematically, e.g. those who show adding facts in order, with or without structured apparatus.
• Are beginning to have fluent recall of adding and subtracting facts to 10 and who know when to use these to help when adding and subtracting.
• Have fluent recall of doubles totalling no more than 10 and use them to help when adding and subtracting adjacent numbers.
• Are beginning to recognize that there is a relationship between adding and subtracting facts that can be helpful when solving mathematical problems.
• Know that there needs to be the same value on both 'sides' of the '=' symbol if a number sentence is correct.

## NPC Milestone 5

• Recall some adding and subtracting facts to 10, including doubles and adding and subtracting zero; know when to use these (NPC 1:5e)

## Explorer Progress Book 1b, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 25: Winning Row

After completing work on Activity 12, give children Explore More Copymaster 25: Winning Row to take home.

## Focus activities

1. Adding with zero
2. Subtracting with zero
3. Exploring 4 – finding adding facts using two numbers
4. Exploring 4 – finding adding facts using the Numicon Pan Balance
5. Exploring 4 – finding subtracting facts
6. Exploring 4 – parts and wholes
7. Exploring 6 – finding adding facts
8. Exploring 6 – finding subtracting facts
9. Exploring 5 – finding subtracting facts
10. Exploring 5 – finding adding facts
11. Exploring 8 – finding adding facts
12. Exploring 8 – finding subtracting facts
13. Exploring 9 – finding adding facts
14. Exploring 9 – finding subtracting facts
15. Exploring 7 – finding adding facts
16. Exploring 7 – finding subtracting facts
17. Exploring 3 – finding adding facts
18. Exploring 3 – finding subtracting facts
19. Exploring 10 – finding adding facts
20. Exploring 10 – finding subtracting facts
21. Double the amount
22. Relationships between adjacent numbers

# Measurement 4: Comparing, ordering and measuring heaviness

**Key mathematical ideas**  Mass and weight, Comparing, Non-standard Units

## Educational context

In this activity group children are introduced to: the idea of weight through exploring experiences of 'heaviness'; and measuring weight through trying to describe 'how heavy' some objects are.

They begin by comparing the heaviness of items held in their hands, and are encouraged to appreciate the difference between heaviness and size (or weight and volume). The difficulty of distinguishing between similar weights is resolved by introducing pan balance scales, making more precise comparisons possible and helping with the task of ordering groups of objects by heaviness.

Non-standard units are introduced as an initial shared language for describing, comparing and weighing single objects using the pan balance. The importance of using identical objects as units is explored, laying the foundations for children's understanding of the idea of using a unit of measure.

## Learning opportunities

• To use the terms 'heavy' and 'light'.
• To understand how a pan or bucket balance works.
• To describe how much objects weigh, using non-standard weights such as cubes, e.g. 'the pencil weighs the same as 2 cubes'.

## Terms for children to use

weighs, weighing, predict, balances, light, lighter, lightest, heavy, heavier, heaviest, greater, greatest, small, smaller, smallest, large, larger, largest, more, less, lesser, compare, equal

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Describe how a bucket or pan balance works and know how to use it.
• Know how to compare the heaviness of two or more items.
• Weigh three or more items and order them from heaviest to lightest and vice versa.
• Understand that heaviness is not linked to the size of an item, so that a small item can be heavier than a larger item.
• Weigh small items using a balance and know that the items weigh the same when the pans are level.

## GMS Milestone 1

• Investigate the comparative mass of three or more objects, ordering them using terms such as 'heavy', 'heavier', 'heaviest' (GMS 1:2c)
• Find objects or give everyday examples, to show that the mass of an item is not linked to its overall size (GMS 1:2d)
• Use a pan balance accurately when comparing two items, and for finding mass using non-standard units (GMS 1:2e)

## Explorer Progress Book 1, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 9: Heavier or Lighter?

After completing work on Activity 1, give children Explore More Copymaster 9: Heavier or Lighter? to take home.

## Focus activities

1. Finding out which is heavier and which is lighter
2. Weighing using a pan balance
3. Comparing the heaviness of three objects
4. Weighing using non-standard weights and a pan balance

# Calculating 5: Halves and quarters of wholes

**Key mathematical ideas**    Fractions as operators, Equivalence, Mathematical thinking and reasoning

## Educational context

The activities in this activity group build on children's everyday experiences of partitioning wholes into halves, e.g. sharing half a cake to introduce the idea of 'half' as one of two equal parts, and 'quarter' as one of four equal parts. The activities also build on scaling work (Number, Pattern and Calculating 1, Calculating 4) where children have been doubling numbers and their work on equivalence (*Number, Pattern and Calculating 1*, Pattern and Algebra 1). Some of the key ideas that children will meet later involving fractions are very challenging, so in this introduction the activities are essentially practical, and give children opportunities to find ways of halving and quartering one unit or whole to begin to develop their understanding of 'one half' as being 'one of two equal parts', and 'one quarter' as being 'one of four equal parts'. This work lays the foundation for fraction notation when it is introduced in Number, Pattern and Calculating 2.

## Learning opportunities

• To understand that 'one half' means one of two equal parts of a whole thing or amount.
• To realize that a whole Shape can be halved in different ways.
• To understand that 'one quarter' means one of four equal parts of a whole thing or amount.
• To notice that we can divide something into four parts by finding half and half again.
• To realize that a half is equal to two quarters.
• To realize that one whole can be shown as two halves or four quarters.

## Terms for children to use

half, quarter, part(s), whole, equal parts, fold, circle, square, half/halves, halve, 'half and half again', 'halve and halve again', double, diagonal, side, vertical, horizontal

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Begin to understand the inverse relation between doubling and halving.
• Divide a whole shape into halves and into quarters.
• Describe the relationship between halves and quarters.
• Explain in their own way one half as 'one of two equal parts' and one quarter as 'one of four equal parts'.

## NPC Milestone 5

• Begin to recognize that there is a relationship between adding and subtracting and between doubling and halving (NPC 1:5f)
• Begin to understand that finding half means one of two equal parts of an object, shape or quantity (NPC 1:5g)

## Explorer Progress Book 1b, pp. 18–21

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.
Children will also have the opportunity to complete their Learning Log (pp. 20–21) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 26: Halving Shapes

After completing work on Activity 3, give children Explore More Copymaster 26: Halving Shapes to take home.

## Focus activities

1. Finding out about 'half' and 'quarter'
2. Cutting sandwiches into halves and quarters
3. Finding halves and quarters of squares
4. Finding halves and quarters of circles
5. Halving collections of discrete objects

# Measurement 5: Comparing, ordering and measuring capacity

**Key mathematical ideas**   Capacity and volume, Equivalence, Comparing, Ordering, Non-standard Units

## Educational context

In this activity group children are introduced to capacity (and hence volume) through first considering the descriptions 'empty' and 'full', then by making more precise, graduated comparisons by considering 'Which holds more?' Measurement of capacity is then introduced via the question 'How much does this hold?' Relatively smaller containers are used as non-standard units of capacity, for example the capacity of a large bottle might be measured as the number of yoghurt pots required to fill it. Note that in any of the activities water may be substituted for dry materials which pour, such as sand or rice. Children continue to access general ideas about measurement which were encountered in Measurement 1 and 4, including the importance of using identical, agreed units. They are also introduced to estimating and begin to consider the concept of accuracy, for example in thinking about whether using smaller containers to measure capacity will give a more accurate result.

## Learning opportunities

• To know the difference between 'full' and 'empty'.
• To understand capacity as a measure of the amount of liquid a container can hold.
• To choose suitable non-standard units to work out the capacity of a container.
• To see the importance of careful and accurate measuring, e.g. a container being used as a unit of measure should be filled to the same height each time.

## Terms for children to use

capacity, accurate, measure, compare, full, nearly full, nearly half full, nearly empty, empty, holds, contains, container, fill, scale, empty, more than, less than, the same as, equal to, measure, estimate

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Estimate, compare, sort and order different containers according to their capacity in non-standard units.
• Understand the importance of using a consistent unit to measure the capacity of a variety of containers.

## GMS Milestone 2

• Fill containers to illustrate capacity terms, e.g. 'empty', 'half full', 'nearly full' (GMS 1:2f)
• Choose and use smaller containers to estimate and measure the capacity of larger containers (GMS 1:2g)
• Explain the need to use a consistent unit when comparing the capacity of a variety of containers (GMS 1:2h)

## Explorer Progress Book 1, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 10: Which Holds More?

After completing work on Activity 1, give children Explore More Copymaster 10: Which Hold More? to take home.

## Focus activities

1. Finding out which holds more and which holds less
2. Finding out how much a container holds
3. Finding capacities using a variety of non-standard units
4. Measuring more accurately

# Pattern and Algebra 2: Reasoning with Numicon Shapes and number ideas

**Key mathematical ideas**   Pattern, Mathematical thinking and reasoning

## Educational context

The activities in this group involve children solving puzzles and problems by reasoning and using their knowledge of adding facts to 10. The 'Cover the board' activity (Activity 1), while not directly dependent upon adding facts to 10, requires children to work out how they will use different combinations of Shapes. Building oblongs with Numicon Shapes (Activity 6) is accessible to all children, but can be extended as children realize how their knowledge of number facts can help them.
It is a good idea for teachers to explore these activities themselves before asking children to work on them.

## Learning opportunities

• To look for patterns and to notice that it is easier to spot them when work is organized systematically.
• To know when to use number facts up to 10 to solve problems.
• To be able to use number facts up to 10.

## Terms for children to use

pattern, similar, different, combination, estimate, organize, systematic, group, score, because, cannot be, never, always, maybe, turn around, turn over, right way up, upside down

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Recognize that it is important to be well organized and to work systematically, e.g. those who show adding facts in order with structured apparatus.
• Recognize when their knowledge of number facts can help them to solve a problem.
• Have recall of number facts to 10 and can use their knowledge to solve a problem.
• Make a general statement after they have noticed something always happening.

## Explorer Progress Book 1c, pp. 2–3

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 14: Pizza Halves

After completing work on Activity 4, give children Explore More Copymaster 14: Pizza Halves to take home.

## Focus activities

1. Cover the board without using 1-shapes
2. Dartboard
3. Guess which Shape is in the bag
4. Which coins are in the purse?
5. Three in a row
6. Building oblongs with Numicon Shapes

# Pattern and Algebra 3: Odd and even

**Key mathematical ideas**    Pattern, Mathematical thinking and reasoning

## Educational context

Even though children may be using the terms 'odd' and 'even' correctly, it is important for them to work through the activities in this group. Understanding odd and even numbers is useful during much of their later work, particularly work on, e.g. factors and prime numbers, in which they need to recognize divisibility. Recognizing odd and even numbers can also be helpful when children are looking for general rules in their work on Pattern and Algebra.

## Learning opportunities

• To look for patterns and notice that it is easier to spot them when work is organized systematically.
• To use the terms 'odd' and 'even' when referring to numbers and totals.
• To name odd and even numbers to 10.
• To begin to explore what happens when odd and even numbers are added together.

## Terms for children to use

odd, even, next, pattern, add, more, plus, equals, every other, because, cannot be, never, always

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Recognize that it is important to be well organized and to work systematically, e.g. those who use numbers in order to avoid missing any out.
• Use 'odd' and 'even' as descriptive number terms.
• Name odd and even numbers to 10.
• Know that a general statement can be made after they have noticed something always happening: that an odd number always follows an even number (or an even number always follows an odd number) when counting whole numbers in ones.

## NPC Milestone 6

• Use the terms odd and even when referring to numbers and totals; name odd and even numbers (to 10) (NPC 1:6a)

## Explorer Progress Book 1c, pp. 4–5

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 15: Odd and Even

After completing work on Activity 3, give children Explore More Copymaster 15: Odd and Even to take home.

## Focus activities

1. Beginning to explore odd and even
2. Investigating odd and even numbers using socks
3. Investigating odd and even with Numicon Shapes
4. Beginning to look at patterns when adding odd and even Numicon Shapes

# Calculating 6: Understanding subtracting as 'difference' and as 'how many more?'

**Key mathematical ideas**   Adding, Subtracting, Zero, Inverse, Mathematical thinking and reasoning

## Educational context

This activity group builds on previous work with subtracting as 'difference'. It begins with comparing heights and quantities and relating these to number ideas, continuing the use of the '<' and '>' symbols.

Children then find the difference in a data handling situation, enabling further questioning and conversation about differences. This leads to discussion about how we might write 'the difference between'. While children are introduced to the subtracting symbol as a way of writing a 'difference' subtracting sentence, they are not expected to use it independently.

This group of activities also uses the 'inverse of addition' structure for subtracting, in which children have to find 'how many more?' are needed to reach a given number. The idea of 'how many more?' can often be confusing for children: 'more' has previously always meant an increase when adding, but it is now being linked to subtracting. Accordingly, the activities provide plenty of practice in using this structure, including in the everyday situation of comparing money values and giving change.

Alongside subtracting, the activity group also presents an opportunity for children to think about capacity – a concept it is important that they experience and explore. This is provided in the form of an investigation, in Activity 2, about the conservation of amount in different- shaped containers.

## Learning opportunities

• To learn how to find differences between small numbers without counting.
• To understand 'how many more?' as a way to find an answer to a subtracting problem.
• To solve difference problems in a data handling situation.

## Terms for children to use

greater than, less than, subtract, difference, the difference between, how many more?, how much more?, equals, pattern, similar, different, subtracting symbol

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are able to use the '<' and '>' symbols effectively when comparing number ideas.
• Are able to find differences between small numbers without counting.
• Make connections and solve difference problems in a data handling situation.
• Begin to use the inverse relationship between adding and subtracting.
• Are beginning to understand 'how many more?' as a way of finding an answer to a subtracting problem.

## NPC Milestone 6

• Begin to understand 'how many more?' as a way of finding an answer to a subtracting problem (NPC 1:6e)
• Solve 'difference' problems in a data handling situation (NPC 1:6f)

## Explorer Progress Book 1c, pp. 6–7

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 27: Busy Bees

After completing work on Activity 6, give children Explore More Copymaster 27: Busy Bees to take home.

## Focus activities

1. Measuring and comparing heights
2. Comparing quantities of dry sand or liquid
3. Finding the difference in data handling
4. Writing 'the difference between … and … is …' using word cards
5. How much older?
6. 'How many more?' with Numicon Shapes
7. 'How many more?' with number rods
8. How much more money?
9. Beginning to relate 'how much more?' to giving change

# Geometry 3: Recognizing and imagining common 3D shapes

**Key mathematical ideas**   Sorting, Describing parts and properties of shapes invariant under transformations, Equivalence

## Educational context

The activities in this group build on children's experiences with flat 2D shapes in Geometry 1 and 2 to introduce work on solid 3D shapes, in particular cubes, cuboids, pyramids, spheres, cylinders and cones. Here children move on to consider parts, properties and movements (transformations) of shapes with a third dimension, and to connect this with their knowledge and understanding of shape and space in two dimensions. For example, the fact that turning takes place about a central line rather than a central point. As children develop their geometrical reasoning, they also begin to be able to imagine and generalize about 3D shapes. They are introduced to 'edge' and 'surface' as names for parts of 3D shapes, enabling them to talk and reason on the basis of common terms. They are encouraged to come up with their own names for categories of shapes – for example, they might call cones 'curved pyramids' (recognizing that both cones and pyramids are 'pointed', but cones have curved surfaces while pyramids do not). In this way they explore possible categorizations of 3D shapes, before moving on to learn the conventional mathematical names in Geometry 4.

## Learning opportunities

• To describe solid 3D shapes using terms such as 'surface', 'solid', 'curved', 'straight' or 'round'.
• To begin to connect the shapes of real-life objects with common solid 3D shapes.
• To develop an understanding of relationships, similarities and differences between solid 3D shapes.
• To recognize common solid 3D shapes, in different positions, sizes or orientations.
• To sort shapes according to their sizes, parts and properties.
• To begin to visualize common 3D shapes.

## Terms for children to use

corner, edge, surface, curved, straight, round, flat, solid, smaller than, smallest, bigger than, biggest, largest, longer, shorter, next to, between, smooth, solid, 2D shapes, 3D shapes, box, tube, round pyramid, next to, between, point

## Assessment opportunities

Look and listen for children who:
• Use the words and terms for use effectively.
• Recognize and describe common solid 3D shapes.
• Recognize common solid 3D shapes irrespective of size and orientation.
• Select the solid 3D shapes required to build a specific model.

## GMS Milestone 2

• Discuss differences between 2D flat and 3D solid shapes, using terms such as 'surface', 'edge', 'corner', 'curved', 'flat' (GMS 1:2i)
• Find 3D shapes within everyday objects and consider the properties of these shapes when building models (GMS 1:2j)
• Identify and visualize 3D shapes of different sizes and orientations (GMS 1:2k)

## Explorer Progress Book 1, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 3: Building 3D Models

After completing work on Activity 1, give children Explore More Copymaster 3: Building 3D Models to take home.

## Focus activities

1. Exploring solid 3D shapes and introducing surfaces and edges
2. Comparing real-life objects and solid 3D shapes
3. Imagining solid 3D shapes
4. Identifying solid 3D shapes of different sizes
5. Modelling with solid 3D shapes

# Numbers and the Number System 3: Exploring number lines and counting in steps

**Key mathematical ideas**    Counting, Pattern, Order, Mathematical thinking and reasoning

## Educational context

Children are, by now, likely to be able to recite the sequence of tens numbers; these activities also include reciting the sequences of twos and fives numbers. The activities in this group build on this ability. Children's counting is supported by the structure of the Numicon Shapes, number rods and number lines to encourage them to understand the relationships between the numbers within each sequence. The use of different number lines helps children to realize that all number lines show numerals in order. Note that children are not asked to count backwards until they are secure in counting forwards in these sequences.

Children have not yet been introduced to the term 'multiple', so multiples of ten are called 'tens numbers' throughout Number, Pattern and Calculating 1.

## Learning opportunities

• To introduce the Numicon 10s Number Line.
• To practise finding numbers on the Numicon 0–100 cm Number Line.
• To connect 0–100 as a number line with a 0–100 square and with the Numicon 10s Number Line.
• To describe and extend number sequences when counting in steps of 2, 5 and 10.

## Terms for children to use

number names to 100, find, along, before, after, between, count, add on, tens, twos, fives, fill, more, tens number, how many?, check, estimate, group, pattern, numeral, number line, counting in steps, steps

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Find the last number in a count on a 0–100 cm number line.
• Distinguish between teen and 'ty' numbers on a number line without confusion, e.g. 15 and 50.
• Recite the sequence of tens numbers, starting at 0.
• Build any tens number between 0 and 100 with Numicon Shapes, number rods or 10p coins.
• Write down the sequence of tens numerically, starting at 0.
• Recite the sequence of twos, starting at 0, and place 2-shapes on the Numicon 10s Number Line as they do so.
• Recite the sequence of fives, starting at 0, and place 5-shapes on the Numicon 10s Number Line as they do so.
• Have strategies for finding numbers on the number line, e.g. using the tens numbers as 'signposts'.
• Say the numbers that are next to any tens number, e.g. for 30, say 29 and 31.

## NPC Milestone 6

• Count in 2s, 5s and 10s supported by structured apparatus (NPC 1:6b)

## Explorer Progress Book 1c, pp. 8–9

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 20: Rows of Tens

After completing work on Activity 5, give children Explore More Copymaster 20: Rows of Tens to take home.

## Focus activities

1. Finding how many 1p coins by grouping and counting in tens
2. Making a 10s number line
3. Connecting 10-rods with the Numicon 0–100 cm Number Line
4. Labelling tens numbers
5. Looking at tens numbers on number tracks and number lines
6. Connecting different versions of the number line
7. Counting in twos
8. Counting in fives

# Calculating 7: Developing recall of adding and subtracting facts within 10

**Key mathematical ideas**   Adding, Subtracting, Pattern, Mathematical thinking and reasoning

## Educational context

This activity group builds on all previous work about adding and subtracting number facts to 10 (see Calculating 4). Establishing and maintaining fluency with these facts is such an important 'tool' for children's calculating that we strongly advise these activities are revisited frequently until children have this fluent recall.

When working with Numicon Shapes, children initially need the experience of handling them constantly. Gradually, as confidence grows, they may just 'use their eyes' and look at the Numicon Display Number Line or other images displayed in the room. Finally, they become able to use the images of the Shapes virtually – 'in their mind's eye' – along with instant recall of known facts.

To support this progression, it is important to have conversations with children about what they might be visualizing. Occasionally some children need a gentle nudge or reminder that they can visualize the Shapes, just as in earlier work some need the reminder not to count the holes. If children still need to handle the Numicon Shapes constantly, they should return to Calculating 4 and any earlier activities that will build confidence. Where children are working in pairs, encourage them to challenge each other to work by visualizing the Shapes: 'Remember not to count!'

Due to the fact that the number rods are more abstract than the Numicon Shapes, we have found it usually takes children a little longer to become confident with them. Children need plenty of time to familiarize themselves with the number rods. It is important not to rush them through the activities that use them.

## Learning opportunities

• To have instant recognition of the Numicon Shape patterns.
• To become fluent with adding and subtracting facts to 10 and to recognize that these can be useful in many different situations.
• To begin to understand and use the relationship between adding and subtracting and to know that it is helpful when solving number problems.
• To experience situations when it is useful to use adding and subtracting number facts to 10.

## Terms for children to use

add, plus, total, compare, subtract, take away, minus, difference, equals, facts, pattern, similar, different, combination, remember

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Have instant recognition of Numicon Shape patterns and number rods.
• Are beginning to understand when to use the relationship between adding and subtracting.
• Are beginning to have fluent recall of adding and subtracting facts to 10 and who know when to use them to help solve number problems.
• Have fluent recall of adding and subtracting facts to 10 and who know when to use them to help solve number problems.
• Are beginning to use their understanding about relationships between numbers to solve further problems.

## NPC Milestone 6

• Instantly recognize Numicon Shape patterns and number rods as representations of numbers (NPC 1:6c)
• Fluently recall adding and subtracting facts of numbers to 10 and use these when calculating and solving real problems (NPC 1:6d)

## Explorer Progress Book 1c, pp. 10–11

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 28: Alien Scores

After completing work on Activity 2, give children Explore More Copymaster 28: Alien Scores to take home.

## Focus activities

1. [Visualizing](#)
2. [Recalling adding and subtracting facts for each number to 10](#)
3. [Recalling adding and subtracting number facts to 10 with number rods](#)
4. [What Shape is in the Bag?](#)
5. [Solving written adding and subtracting calculations](#)
6. [Target Board with Numicon Shapes](#)

# Numbers and the Number System 4: Structure of 2-digit numbers and more ordering

**Key mathematical ideas**    Counting, Pattern, Order, Place value, Equivalence, Mathematical thinking and reasoning

## Educational context

The activities in this group build on children's earlier work with 2-digit numbers, to give them opportunities to understand the 'grouping in tens' structure that underlies our place value code, and to use this understanding to order 2-digit numbers. The initial focus is on numbers 20–30 (extending to 40 and beyond as appropriate). The activities provide opportunities for children to explore number relationships and recognize patterns in the way numbers are named as they build 2-digit numbers with Numicon Shapes and number rods, label them and make connections with number lines. Children also have opportunities to continue to extend their understanding of place value, with special emphasis given to looking at the equivalence between quantity value and column value. The Numicon Shapes and number rods can illustrate these ideas very well, enabling children to see the size of the number as well as the structure of tens and ones.

Look and listen for children making the common error of describing numbers written in numerals as 'two and eight', for example. Correct this by reminding them of the imagery of Shapes or rods, showing them what the first 2 represents and modelling the phrase 'two tens and eight' or 'twenty and eight'.

## Learning opportunities

• To read, write and build 2-digit numbers.
• To begin to understand the quantity value and column value of 2-digit numbers.
• To begin to compare and order 2-digit numbers.

## Terms for children to use

number names 1–100, ordinal number words (e.g. first, second, third), tens numbers, ones, order, more, continue, next, numeral, count, between, find, check

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Build 2-digit numbers with Numicon Shapes when they hear the number name or see the written numeral or word.
• Read numerals for 2-digit numbers and begin to read number words.
• Write numerals for 2-digit numbers when they hear the number name or see the number word.
• Say and write the 2-digit number name from seeing the number built with Numicon Shapes or number rods.
• Describe the quantity value of 2-digit numbers, e.g. on seeing '37', say, 'There are thirty-seven ones in 37, and the 3 means thirty ones.'
• Are beginning to describe the column value of 2-digit numbers, e.g. can point to the '3' in '37' and say 'three tens'.
• Explain that numbers with more tens are larger than numbers with fewer tens.

## NPC Milestone 7

• Read, say and build 2-digit numbers from seeing numerals (NPC 1:7c)
• Use Shapes and rods to build and write 2-digit numbers from hearing number names (NPC 1:7d)

## Explorer Progress Book 1c, pp. 12–13

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 21: Spot the Number

After completing work on Activity 5, give children Explore More Copymaster 21: Spot the Number to take home.

## Focus activities

1. Building, naming and labelling numbers 20 to 30 with Numicon Shapes
2. Building, naming and labelling numbers 20 to 30 with number rods
3. Looking at quantity value and column value
4. Being in the right place
5. Recognizing, saying and writing 2-digit numbers
6. Using the Numicon 10s Number Line and the 0–100 cm Number Line
7. Comparing the size of two collections

# Pattern and Algebra 4: Logic

**Key mathematical ideas**   Pattern, Mathematical thinking and reasoning

## Educational context

This activity group gives children opportunities to develop a logical approach to solving problems. The group begins with revising work on sets. It then progresses to a difficult idea for many children, the 'not' set. Children may need time to gain confidence with this idea and will benefit from having opportunities to develop it in other curriculum areas, such as science. Seeing the importance of being systematic and learning to work in an organized way are helpful life skills as well as important tools for solving mathematical problems. The final activity in the group requires children to organize objects or pictures to solve a problem.

## Learning opportunities

• To describe objects according to their attributes.
• To learn how to use those attributes to help solve problems.
• To look for patterns and notice that it is easier to spot them when work is organized systematically.

## Terms for children to use

pattern, similar, the same, different, organize, systematic, group, set, because, cannot be, always, belong, is part of, thin, thick, large, small

## Assessment opportunities

Watch and listen for children who:
• Use the terms for children to use effectively in discussion.
• Recognize that it is important to be well organized and to work systematically.
• Make a general statement after they have noticed something happening regularly.
• Describe objects according to their attributes.
• Sort objects according to their attributes.
• Are able to describe and sort a 'not' set.

## NPC Milestone 7

• Use attributes of objects or numbers to help solve problems (NPC 1:7a)
• Organize work systematically and notice patterns (NPC 1:7b)

## Explorer Progress Book 1c, pp. 14–15

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 16: Sets of Shapes

After completing work on Activity 4, give children Explore More Copymaster 16: Sets of Shapes to take home.

## Focus activities

1. Following rules to make sets
2. Sorting fruit – the 'not' set
3. Sorting buttons
4. Playing a matching game
5. Knowing we have a complete set
6. Organizing sets using a grid

# Geometry 4: Comparing and naming common solid 3D shapes

**Key mathematical ideas**  Classifying shapes, Describing parts and properties of shapes invariant under transformations, Equivalence

## Educational context

In Geometry 3, children actively explored the parts and properties of common solid 3D shapes. The activities in this group continue this work with further emphasis on communication, introducing conventional categories and names for 3D shapes. Children learn to generalize in order to discriminate between cubes, cuboids, pyramids, spheres, cylinders and cones, and to reason about the relationships between these shape categories. Children explore the relationship between 2D and 3D space, moving on from combining and tiling shapes in two dimensions (in Geometry 2) to combining, packing and building with shapes in three dimensions. There are opportunities to begin to establish important connections between 2D and 3D shapes, in preparation for later work on the faces of 3D shapes.

Encourage children to develop their geometrical reasoning – particularly in relation to distinguishing cuboids (which, unlike cubes, come in a variety of forms) and cones (which have similarities to both cylinders and pyramids) – by asking them to explain their choices and results. Use 'Why … ?' questions to prompt them to clarify their thinking, and 'What if … ?' questions to help them imagine transformations and generalized shape ideas, and so build up their 'mental geometry' skills.

## Learning opportunities

• To recognize and name solid 3D shapes from their 2D illustrations.
• To name 2D and 3D shapes.
• To use the language of comparison in conversation.
• To describe solid 3D shapes using terms like 'surface' and 'edge', 'curved' and 'flat', 'straight' and 'round'.
• To recognize common solid 3D shapes in different positions, sizes and orientations.
• To begin to visualize common solid 3D shapes.

## Terms for children to use

square, oblong, triangle, circle, cube, cuboid, pyramid, sphere, cylinder, cone, corners, edges, straight, curved, smaller than, smallest, bigger than, biggest, longer than, longest, shorter than, shortest, same/equal length, above, below, next to, box, ball, tube, flat, round

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Name common 3D shapes, irrespective of size and orientation, e.g. cube, cuboid, pyramid, sphere, cylinder, cone.
• Name common 2D shapes, e.g. square, oblong, triangle, pyramid, circle.
• Use the names of 3D shapes to describe real-life objects.
• Distinguish between 2D and 3D shapes.
• Describe the differences between a cube and a cuboid, e.g. a cube has all square surfaces.

## GMS Milestone 3

• Name cubes and cuboids of varying sizes, understanding that cuboids can be different shapes (GMS 1:3a)
• Name spheres, cylinders, cones and pyramids of varying sizes (GMS 1:3b)
• Describe how 2D and 3D shapes might be grouped in different ways, according to similarities in appearance (GMS 1:3c)

## Explorer Progress Book 1, pp. 20–21

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 4: Finding 3D Shapes at Home

After completing work on Activity 6, give children Explore More Copymaster 4: Finding 3D Shapes at Home to take home.

## Focus activities

1. Describing the parts and properties of solid 3D shapes
2. Naming cubes and cuboids
3. Building with cubes and cuboids
4. Naming spheres, cylinders and cones
5. Building pyramids
6. Identifying 3D shapes from their names and comparing them to 2D shapes

# Calculating 8: Adding more than two numbers

**Key mathematical ideas**   Adding, Subtracting, Pattern, Associative property of addition and facts for 11 and 12, Mathematical thinking and reasoning

## Educational context

This activity group explores the associative property of addition, calculations involving more than two numbers and includes a lot of reasoning. It begins by looking at different ways of adding three numbers and the strategies that might be helpful, including mental recall of adding facts. If children are not very confident when adding whole numbers, they should continue to use the Numicon Shapes and number rods, rather than counting in ones. They may find it helpful to revisit earlier activity groups about adding, particularly Calculating 4, until they are confident in adding using whole numbers. Some of the activities here provide the opportunity to find all possibilities, but for most children developing an understanding that there are different possibilities is enough. The activities then move on to revising adding facts to 10 and encourage children to use their knowledge of adding to 10 to add three numbers totalling between 11 and 20 and to develop fluency with number facts for 11 and 12. By looking closely at adding and subtracting questions for 11 and 12 children begin to understand that they need to select the most efficient strategy to solve different adding and subtracting questions. The strategies explored include adjusting/compensating numbers to make the calculations easier, using doubles facts and using the inverse relation. Since there are no Numicon Shapes or number rods for the teen numbers, the combination for, e.g. 11 + 1 has to be made using three Shapes or rods. If children need help to see the 'teen' numbers as 'whole numbers' the grey Numicon Shapes (available separately) can be used, alternatively the component Shapes or rods can be stuck together with adhesive tack.

## Learning opportunities

• To add whole numbers.
• To become fluent with adding facts to 10 and to recognize when these can be useful.
• To understand the associative property of addition.
• To learn the adding and subtracting facts for 11 and 12.
• To become more confident about using a wide range of strategies to solve adding and subtracting questions.

## Terms for children to use

combine, add, plus, total, equals, facts, pattern, combination, estimate, score, possibilities, order, double

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are confident about adding with whole numbers.
• Have recall of adding facts to 10 and know when to use these to help with adding problems.
• Have recall of adding and subtracting facts for 10 and can use these when finding adding and subtracting facts for 11 and 12.
• Have recall of doubles of numbers 1–5 and who know when to use these to help with adding problems.
• Work in an organized way to show adding or subtracting facts in order, both when building them with apparatus and when writing them down.
• When adding more than two numbers, strategically choose which pair of numbers to add first showing they understand that there can often be several ways to reach a solution.

## NPC Milestone 7

• Use different strategies to add three numbers less than 10 (NPC 1:7e)
• Know that adding can be done in any order (NPC 1:7f)

## NPC Milestone 8

• Know that sometimes there is more than one answer to a question (NPC 1:8c)
• Know when to use facts of numbers up to 10 to solve problems (NPC 1:8f)
• Reason how to adjust known adding and subtracting facts for 10 to find facts for 11 and 12 (NPC 1:8g)

## Explorer Progress Book 1c, pp. 16–17

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group.
Refer to the assessment opportunities for assistance.

## Explore More Copymaster 29: Party Bags

After completing work on Activity 7, give children Explore More Copymaster 29: Party Bags to take home.

## Focus activities

1. Adding three single digits
2. Finding Shapes for a given total
3. Buying three items at the shop
4. Finding out scores
5. Revising adding facts to 10
6. Revising teen numbers
7. Finding how many to 10, then adding a single-digit number
8. Recognizing and using adding facts to 10
9. Finding out about 11
10. Subtracting facts for 11
11. Investigating 12
12. Subtracting facts for 12
13. Remembering adding facts for 12

# Calculating 9: Partitioning into tens and ones

**Key mathematical ideas**   Place value, Adding, Subtracting, Pattern, Equivalence, Mathematical thinking and reasoning

## Educational context

This activity group looks at how numbers greater than 10 may be partitioned into tens and ones. It begins by focusing on teen numbers, looking at the adding and subtracting sentences that result from partitioning. Later activities work with numbers 20 to 30, where there are more possible ways of partitioning – although we keep the focus on partitioning into tens and ones. While this activity group is predominantly about quantity value, children still have opportunities to develop their understanding about the equivalence between quantity value and column value. Some of the activities may seem to have very small steps but we have found these to be of great benefit in supporting children's understanding.

## Learning opportunities

• To develop further understanding of teen numbers and the denary structure (base ten system) of number notation through adding and subtracting tens and ones.
• To begin to partition numbers up to 30 into tens and ones.
• To know when to partition into tens and ones to help solve a problem.
• To continue to develop understanding of the quantity value and column value of 2-digit numbers.

## Terms for children to use

pattern, tens, ones, adding, subtracting, teens numbers, equals, 2-digit number, partition

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Are able to partition a teen number into a ten and ones and who can recombine them to make the teen number.
• Use structured apparatus to help them partition any 2-digit number into tens and ones.
• Know when to partition into tens and ones to help solve a problem.
• Are beginning to understand the equivalence between quantity value and column value.

## NPC Milestone 8

• Show understanding of the equivalence between quantity value and column value (NPC 1:8d)
• Know when to partition into tens and ones to help solve a problem (NPC 1:8e)

## Explorer Progress Book 1c, pp. 18–19

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what kind of progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 30: Number Squares

After completing work on Activity 7, give children Explore More Copymaster 30: Number Squares to take home.

## Focus activities

1. Partitioning teen numbers into a ten and ones
2. Partitioning into tens and ones with Numicon Shapes
3. Subtracting ones from a teen number
4. Using the Numicon 10s Number Line and the 0–100 cm Number Line
5. Subtracting from numbers 11–20
6. Subtracting 10 from a teen number
7. Adding separate tens and ones to find amounts totalling up to 30
8. Beginning to partition numbers 20–30 into separate tens and ones
9. Finding the total when adding ones to tens numbers
10. Partitioning numbers 20–30

# Measurement 6: Telling the time

**Key mathematical ideas**   Telling the time, Ordering, Standard units, Equivalence

## Educational context

In this activity group, children build on their work on duration and units of time in Measurement 3 to begin to tell the time to the half hour on an analogue clock. They first revisit the idea of linear time by ordering daily events on a timeline and connect this with the repeating cycle of hours illustrated by the analogue clock face. They then expand their timeline to show the 24 hours in a day, with its 12-hour cycles beginning and ending at midday and midnight.

The idea of 'half past' the hour is also introduced using a timeline; this can be connected with children's understanding of fractions based on their number work (for example, in the *Number, Pattern and Calculating 1 Teaching Resource Handbook*, Calculating 5). Children then use geared clocks showing 'o'clock' and 'half past' times to learn about the linked movement of the hour and minute hands.

Ensure children have plenty of practice with telling, drawing and showing the time on clock faces; this can be followed up throughout the school day and related to timetabled lessons, activities and events.

## Learning opportunities

• To understand the terms 'o'clock' and 'half past' in relation to an analogue clock.
• To count round a clock in 'o'clocks'.
• To identify and say when the minute hand is pointing to half past.
• To record 'o'clock' and 'half past' times.
• To work out if an 'o'clock' time is in the day, night, morning, afternoon or evening.
• To recognize events that stay the same each day and ones that change.
• To order events in the day.

## Terms for children to use

early, late, day-time, night-time, morning, afternoon, evening, noon, midday, midnight, clock, hour, minute, second, half past, o'clock, hour hand, minute hand, second hand, long hand, short hand, less time, before, after, next, first, last, before, after, clockwise, turn

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Recognize the features of an analogue clock, e.g. minute and hour hands.
• Show a particular 'o'clock' or 'half past' time using a geared clock.
• Draw hands on a blank clock face to show a particular 'o'clock' or 'half past' time.
• Recognize an 'o'clock' time on an analogue clock.

## GMS Milestone 3

• Order events and times on a 24–hour timeline, using terms such as 'day', 'night', 'midnight', 'midday', 'morning', 'afternoon', 'o'clock' (GMS 1:3d)
• Discuss the features of an analogue clock, explaining the movement of both hands (GMS 1:3e)
• Illustrate o'clock and half past times on a geared clock or blank clock face (GMS 1:3f)

## Explorer Progress Book 1, pp. 22–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

## Explore More Copymaster 11: My Day

After completing work on Activity 2, give children Explore More Copymaster 11: My Day to take home.

## Focus activities

1. How do you know when it's time to …?
2. Our day timeline
3. Day and night times
4. Understanding 'half past' an hour using a timeline
5. Telling the time on a clock face: o'clock and half past

# Pattern and Algebra 5: Finding possibilities

**Key mathematical ideas**   Pattern, Mathematical thinking and reasoning

## Educational context

This activity group gives children experience of finding more than one possibility systematically. At this stage, not all children will be able to find all possibilities, but they should experience beginning to persevere, a sense of enjoyment in finding out and a chance to be supported in working systematically. The final activity in the group is the most challenging – a first introduction to finding all possibilities using calculations. Not all children may be ready for this.

## Learning opportunities

• To look for patterns.
• To notice that it is easier to spot patterns when work is organized systematically.

## Terms for children to use

pattern, similar, different, combination, estimate, organize, systematic, group, score, because, cannot be, never, always, maybe

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively in discussion.
• Recognize that it is important to be well organized and to work systematically, e.g. those who show adding facts in order with structural apparatus.
• Make a general statement after they have noticed something happening regularly.

## NPC Milestone 8

• Organize work systematically (NPC 1:8a)
• Notice when something always happens and explain a general statement in their own way (NPC 1:8b)

## Explorer Progress Book 1c, pp. 20–23

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance. Children will also have the opportunity to complete their Learning Log (pp. 22–23) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 17: Shape Combinations

After completing work on Activity 3, give children Explore More Copymaster 17: Shape Combinations to take home.

## Focus activities

1. How many different flavours of ice cream?
2. How many different 2 × 2 squares with Numicon Shapes?
3. Where could the children sit?
4. Exploring possible Numicon Shape patterns with 10 Pegs
5. Looking for possibilities with number facts

# Geometry 5: Position, direction and movement

**Key mathematical ideas**  Translating and rotating, Direction and orientation in movement, Equivalence

## Educational context

In this activity group children describe movements, and give and follow directions to expand and refine their knowledge and use of conventional positional concepts and terms. They make straight-line (translational) and turning (rotational) movements as well as observing and instructing others making these movements, then go on to encounter the same ideas in the context of playing board games. Programmable robots, if available, provide a stepping stone for this shift in perspective (from children themselves moving in three-dimensional space to children illustrating movement in two-dimensional space). Through this work children begin to understand and distinguish between different types of movement (transformation) important in geometry, and to think about quantifying movement – as a number of steps or a fraction of a turn, for example. This experience begins to create a physical foundation for later work on angle and length in shapes, and on coordinates. It can also be linked to number work. In particular, fractions (covered in *the Number, Pattern and Calculating 1 Teaching Resource Handbook*, Calculating 5) can be connected with full, half, quarter and three-quarter turns. Children also encounter geometrical equivalence, in the sense that there can be different ways of ending up in the same state or position in space: a full turn is the same as two half turns in the same direction, for instance, and there is often more than one way to 'solve' a maze.

## Learning opportunities

• To describe position, direction and movement.
• To give and follow directions for moving around a room and for moving a game piece around a board.
• To make and recognize quarter, half, three-quarter and full turns.
• To know the directions: right, left, clockwise and anticlockwise.
• To understand that a full turn is the same as two half or four quarter turns in the same direction.
• To choose the best route for moving around obstacles or
• across a game board.

## Terms for children to use

up, down, inside, outside, top, middle, bottom, on top of, above, underneath, below, in front of, behind, next to, opposite, between, through, around, near, close, far, left, right, forwards, backwards, quarter/half/three-quarter/full turn, clockwise, anticlockwise

## Assessment opportunities

Look and listen for children who:
• Use the terms for children to use effectively.
• Describe position, direction and movement using a wide variety of words and terms.
• Accurately follow instructions for moving themselves and for moving and placing objects.
• Distinguish between right and left and understand that right and left depend on the direction you are facing.
• Make and recognize quarter, half, three-quarter and full turns.
• Recognize equivalences in size of turns, e.g. that one full turn is the same as four quarter turns in the same direction.
• Understand that turning to the right is the same as turning clockwise.
• Understand that turning to the left is the same as turning anticlockwise.
• Recognize turns in different directions which have the same result, e.g. a whole turn in either direction, a half turn in either direction, a quarter turn in one direction and a three-quarter turn in the other direction.
• Visualize the result of a turn or instruction for moving, e.g. 'take three steps forwards'.

## GMS Milestone 3

• Describe their position, direction and movement using terms such as 'behind', 'next to', 'around', 'left', 'right', 'forwards' (GMS 1:3g)
• Follow instructions to make full, half, quarter and three-quarter turns, both clockwise and anti-clockwise (GMS 1:3h)
• Give verbal instructions to move around a space, using increasingly precise language to refine the sequence (GMS 1:3i)

## Explorer Progress Book 1, pp. 24–27

After completing work on this activity group, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance. Children will also have the opportunity to complete their Learning Log (pp. 25–27) where they can reflect on the mathematics they have done so far.

## Explore More Copymaster 5: Maps and Directions

After completing work on Activity 7, give children Explore More Copymaster 5: Maps and Directions to take home.

## Focus activities

1. Describing position, direction and movement
2. Giving directions
3. Making full and half turns
4. Making quarter turns
5. Giving directions for moving around the school
6. Introducing three-quarter turns
7. Giving directions for moving around a map
8. Moving around an obstacle course game board

# Assessment support

The Explorer Progress Book pages will help you record and assess learning throughout the programme. Here are two additional tools to support you with assessment. Log on to your Numicon Online NZ subscription and click on the name of the resource below to open it.

## Milestone Assessment cards

Materials for children's self-assessment: question cards, category cards, a quick guide, milestone statements, Teaching Progression and answers. NOTE: This resource is provided as a zip file. Download, right-click and click 'Extract' to open the files.

The question cards are also provided on the next page of this document.
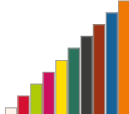


## Milestone Assessment Tracking

A detailed tracking sheet for assessing your class.

| Milestone | Code | NPC / GM | Numicon strand | AG | NC strand |
|---|---|---|---|---|---|
| **Number, Pattern & Calculating 1 Milestone 1** | | | | | |
| By this point, children should be able to: | | | | | |
| • Create repeating patterns that have more than two elements using structured apparatus and other objects | NPC 1: 1a | NPC | P&A | SF1 | Number & place value |
| • Recognize pattern in familiar sequences and predict what comes next | NPC 1: 1b | NPC | P&A | SF2 | Number & place value |
| • Order Numicon Shapes, number rods and numerals 0–10 | NPC 1: 1c | NPC | NNS | SF4 | Number & place value |
| • Describe number relationships between Shapes | NPC 1: 1d | NPC | NNS | SF5 | Number & place value |
| • Identify numerals and represent them using Numicon Shapes, Numicon Shape patterns and number rods | NPC 1: 1e | NPC | P&A | SF3 | Number & place value |
| • Recite number names in order up to (record child's counting range) | NPC 1: 1f | NPC | NNS | SF2 | Number & place value |
| • Count at least 30 objects accurately, one by one | NPC 1: 1g | NPC | NNS | SF2 | Number & place value |
| **Number, Pattern & Calculating 1 Milestone 2** | | | | | |
| By this point, children should be able to: | | | | | |
| • Compile sets according to a chosen criterion; explain why an object does not fit the set | NPC 1: 2a | NPC | P&A | SF9 | Number & place value |
| • Assign numbers to repeating patterns using structured apparatus and other media | NPC 1: 2b | NPC | P&A | SF7 | Number & place value |
| • Read, say and build teen numbers from seeing numerals | NPC 1: 2c | NPC | NNS | SF6 | Number & place value |
| • Build teen numbers using Shapes and rods and write numerals from hearing number names | NPC 1: 2d | NPC | NNS | SF8 | Number & place value |

# Milestone Assessment cards

Click on a Numicon milestone below to jump to the question cards that relate to it.

| Milestone | Milestone statements | |
|---|---|---|
| NPC Milestone 1 | Create repeating patterns that have more than two elements using structured apparatus and other objects | NPC 1:1a |
| | Recognize pattern in familiar sequences and predict what comes next | NPC 1:1b |
| | Order Numicon Shapes, number rods and numerals 0–10 | NPC 1:1c |
| | Describe number relationships between Shapes | NPC 1:1d |
| | Identify numerals and represent them using Numicon Shapes, Numicon Shape patterns and number rods | NPC 1:1e |
| | Recite number names in order up to (record child's counting range) | NPC 1:1f |
| | Count at least 30 objects accurately, one by one | NPC 1:1g |
| NPC Milestone 2 | Compile sets according to a chosen criterion; explain why an object does not fit the set | NPC 1:2a |
| | Assign numbers to repeating patterns using structured apparatus and other media | NPC 1:2b |
| | Read, say and build teen numbers from seeing numerals | NPC 1:2c |
| | Build teen numbers using Shapes and rods and write numerals from hearing number names | NPC 1:2d |
| | Add 1-digit numbers without counting using Numicon Shapes | NPC 1:2e |
| | Illustrate a one-step adding problem with objects and structured apparatus and say the number sentence | NPC 1:2f |
| | Know when to add | NPC 1:2g |
| NPC Milestone 3 | Illustrate a subtracting story with objects and structured apparatus and say the number sentence | NPC 1:3a |
| | Know when to subtract | NPC 1:3b |
| | Use number words as nouns, not just as adjectives e.g. talk about 'five', not just 'five cars', 'five books' or 'five sweets' | NPC 1:3c |
| | Build and read adding sentences with Numicon Shapes, numeral, word and symbol ('+') cards | NPC 1:3d |
| NPC Milestone 4 | Understand and use the language more than/less than/fewer than, most/least/fewest, equal to | NPC 1:4a |
| | Use '<' and '>' to compare objects, structured apparatus and numbers | NPC 1:4b |
| | Understand and use the '=' symbol in different number sentences, e.g. 10 = 3 + 7; 7 = 10 − 3 | NPC 1:4c |
| | Understand the equivalence between coin values | NPC 1:4d |
| | Recognize patterns and explain regularities that they notice in patterns | NPC 1:4e |
| | Order numerals 0–20 | NPC 1:4f |
| | Subtract without counting using Numicon Shapes | NPC 1:4g |
| | Build and read subtracting sentences with Numicon Shapes, numeral, word and symbol cards | NPC 1:4h |

| Milestone | Milestone statements | |
|---|---|---|
| GMS Milestone 1 | Identify squares, oblongs, triangles and circles in flat geometric shapes and the everyday environment | GMS 1.1:a |
| | Use the language of parts and properties, e.g. corners and sides, to show and describe how shapes can be grouped | GMS 1.1:b |
| | Understand that differences in size, position and orientation will not change the names of 2D shapes | GMS 1.1:c |
| | Compare and order objects of different lengths by aligning them to the same starting point | GMS 1.1:d |
| | Choose appropriate non-standard units for measuring different lengths of up to 1 m | GMS 1.1:e |
| | Demonstrate and explain the need for accuracy when measuring using non-standard units | GMS 1.1:f |
| | Recognize 1p, 2p, 5p and 10p coins and show the relative values using Numicon Shapes | GMS 1.1:g |
| | Make an amount of money from different combinations of coins, e.g. 12p | GMS 1.1:h |
| | Sequence events over the course of a day or week, in chronological order | GMS 1.1:i |
| | Recall names of days of the week and months of the year and begin to put them in order | GMS 1.1:j |
| | Consider how long activities may take, e.g. hours, minutes or seconds; and use suitable equipment to time activities in minutes or seconds | GMS 1.1:k |
| NPC Milestone 5 | Start to organize adding and subtracting facts systematically with structured apparatus and number sentences | NPC 1:5a |
| | Explain the pattern of naming numbers, know where to find a number on a number line | NPC 1:5b |
| | Say 'how many?', without counting in ones, by looking at objects grouped in Numicon 10-patterns | NPC 1:5c |
| | Make a sensible estimate | NPC 1:5d |
| | Recall some adding and subtracting facts to 10, including doubles and adding and subtracting zero; know when to use these | NPC 1:5e |
| | Begin to recognize that there is a relationship between adding and subtracting and between doubling and halving | NPC 1:5f |
| | Begin to understand that finding half means one of two equal parts of an object, shape or quantity | NPC 1:5g |
| GMS Milestone 2 | Devise pictures and patterns using 2D shape equipment, including shapes that fit together with no gaps | GMS 1:2a |
| | Copy and build sequences to show which 2D shapes come next in a given repeating pattern | GMS 1:2b |
| | Investigate the comparative mass of three or more objects, ordering them using terms such as 'heavy', 'heavier', 'heaviest' | GMS 1:2c |
| | Find objects or give everyday examples, to show that the mass of an item is not linked to its overall size | GMS 1:2d |
| | Use a pan balance accurately when comparing two items, and for finding mass using non-standard units | GMS 1:2e |
| | Fill containers to illustrate capacity terms, e.g. 'empty', 'half full', 'nearly full' | GMS 1:2f |
| | Choose and use smaller containers to estimate and measure the capacity of larger containers | GMS 1:2g |
| | Explain the need to use a consistent unit when comparing the capacity of a variety of containers | GMS 1:2h |
| | Discuss differences between 2D flat and 3D solid shapes, using terms such as 'surface', 'edge', 'corner', 'curved', 'flat' | GMS 1:2i |
| | Find 3D shapes within everyday objects and consider the properties of these shapes when building models | GMS 1:2j |
| | Identify and visualize 3D shapes of different sizes and orientations | GMS 1:2k |

| Milestone | Milestone statements | |
|---|---|---|
| NPC Milestone 6 | Use the terms odd and even when referring to numbers and totals; name odd and even numbers (to 10) | NPC 1:6a |
| | Count in 2s, 5s and 10s supported by structured apparatus | NPC 1:6b |
| | Instantly recognize Numicon Shape patterns and number rods as representations of numbers | NPC 1:6c |
| | Fluently recall adding and subtracting facts of numbers to 10 and use these when calculating and solving real problems | NPC 1:6d |
| | Begin to understand 'how many more?' as a way of finding an answer to a subtracting problem | NPC 1:6e |
| | Solve 'difference' problems in a data handling situation | NPC 1:6f |
| NPC Milestone 7 | Use attributes of objects or numbers to help solve problems | NPC 1:7a |
| | Organize work systematically and notice patterns | NPC 1:7b |
| | Read, say and build 2-digit numbers from seeing numerals | NPC 1:7c |
| | Use Shapes and rods to build and write 2-digit numbers from hearing number names | NPC 1:7d |
| | Use different strategies to add three numbers less than 10 | NPC 1:7e |
| | Know that adding can be done in any order | NPC 1:7f |
| NPC Milestone 8 | Organize work systematically | NPC 1:8a |
| | Notice when something always happens and explain a general statement in their own way | NPC 1:8b |
| | Know that sometimes there is more than one answer to a question | NPC 1:8c |
| | Show understanding of the equivalence between quantity value and column value | NPC 1:8d |
| | Know when to partition into tens and ones to help solve a problem | NPC 1:8e |
| | Know when to use facts of numbers up to 10 to solve problems | NPC 1:8f |
| | Reason how to adjust known adding and subtracting facts for 10 to find facts for 11 and 12 | NPC 1:8g |
| GMS Milestone 3 | Name cubes and cuboids of varying sizes, understanding that cuboids can be different shapes | GMS 1:3a |
| | Name spheres, cylinders, cones and pyramids of varying sizes | GMS 1:3b |
| | Describe how 2D and 3D shapes might be grouped in different ways, according to similarities in appearance | GMS 1:3c |
| | Order events and times on a 24–hour timeline, using terms such as 'day', 'night', 'midnight', 'midday', 'morning', 'afternoon', 'o'clock' | GMS 1:3d |
| | Discuss the features of an analogue clock, explaining the movement of both hands | GMS 1:3e |
| | Illustrate o'clock and half past times on a geared clock or blank clock face | GMS 1:3f |
| | Describe their position, direction and movement using terms such as 'behind', 'next to', 'around', 'left', 'right', 'forwards' | GMS 1:3g |
| | Follow instructions to make full, half, quarter and three-quarter turns, both clockwise and anti-clockwise | GMS 1:3h |
| | Give verbal instructions to move around a space, using increasingly precise language to refine the sequence | GMS 1:3i |

**1**

## Can you use counters to make a repeating pattern?

## Use three different colours.

NPC Milestone 1:1a

**2**

## Can you use number rods to make a repeating pattern?

## Use three different colours.

NPC Milestone 1:1a

**3**

## Can you add four pegs to continue my pattern?

NPC Milestone 1:1b

**4**

## Can you use the counters to continue my pattern?

NPC Milestone 1:1b

**5**

Can you put the number cards in order from 0 to 10?

Now can you put the Numicon Shapes in order from 1 to 10?

NPC Milestone 1:1c

**6**

Can you put the number cards in order?

Now can you find the rod to match each number?

NPC Milestone 1:1c

**7**

Choose two Numicon Shapes that are next to each other.

What are their numbers?

Which one is more?

Which one is less?

NPC Milestone 1:1d

**8**

What can you tell me about this Numicon Shape?

Tell me some ways it is different from the others.
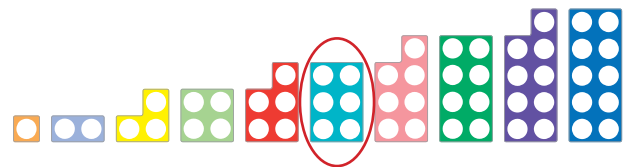
NPC Milestone 1:1d

**9**

## Which number is this?

9

Can you use the things on the table to show this number?

**10**

## Which number is this?

7

Can you show me the Numicon Shape pattern for 7?

**11**

## How far can you count?

Can you count for me starting at 1?

**12**

## Can you count backwards?

What is the largest number you can count back from?

Can you show me?

**13**

Can you count how many pegs are on the table?

NPC Milestone 1:1g

**14**

Can you take 30 counters from the pot?

Count as you take them out and stop when you get to 30.

NPC Milestone 1:1g

**Answers are in bold.**

**1**

**Preparation:** Sort a selection of counters into pots of the same colour. Use three different colours.

Can you use counters to make a repeating pattern?

Use three different colours.



**Answers will vary, e.g.**
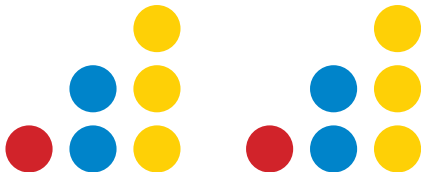


NPC Milestone 1:1a

**2**

**Preparation:** Put a selection of number rods on the tabletop.

Can you use number rods to make a repeating pattern?

Use three different colours.
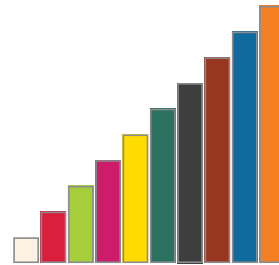


**Answers will vary, e.g.**



NPC Milestone 1:1a

**3**

**Preparation:** Sort a selection of Numicon Pegs into pots of the same colour. Start a pattern for children to continue.

Can you add four pegs to continue my pattern?



**Answers may vary depending on your initial pattern, but for the example above it would be:**



NPC Milestone 1:1b

**4**

**Preparation:** Provide a pot of a single colour of 40 counters. Start the pattern of the Numicon Shapes.

Can you use the counters to continue my pattern?
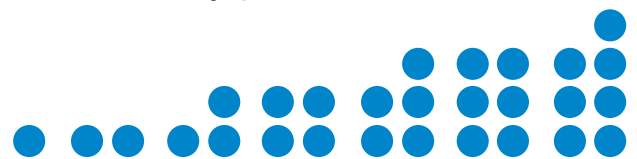


**Children should make the 8-shape with counters.**



NPC Milestone 1:1b

**Number, Pattern and Calculating 1**

**Answers are in bold.**

**5**

**Preparation:** Provide a set of Numeral Cards from 0 to 10 and Numicon Shapes from 1 to 10.

Can you put the number cards in order from 0 to 10?

Now can you put the Numicon Shapes in order from 1 to 10?

**Some children may be less confident with organizing from 10 to 1.**

NPC Milestone 1:1c

**6**
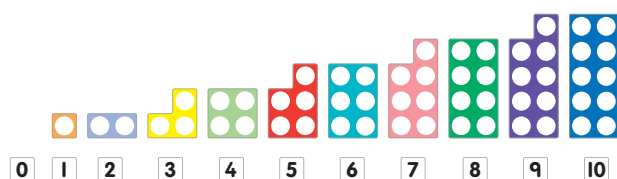
**Preparation:** Provide a set of number cards from 0 to 10 and number rods 1 to 10.

Can you put the number cards in order?

Now can you find the rod to match each number?

**Children can order from either 0 to 10 or 10 to 0.**
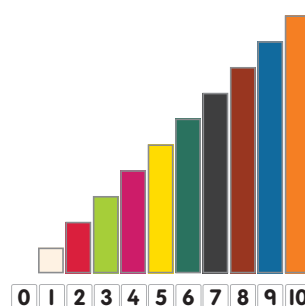
NPC Milestone 1:1c

**7**

**Preparation:** Put a set of Numicon Shapes on a tabletop, in order, from 1 to 10.

Choose two Numicon Shapes that are next to each other.

What are their numbers?

Which one is more?

Which one is less?

**Answers will vary. Look for children who can describe the relationship between the Shapes, e.g. if 4 and 5 are chosen, answers might include: these show the numbers 4 and 5, 5 is 1 more than 4, 4 is 1 less than 5.**

NPC Milestone 1:1d

**8**

**Preparation:** Put a set of Numicon Shapes on a tabletop, in order, from 1 to 10.

Select the 6-shape.

What can you tell me about this Numicon Shape?

Tell me some ways it is different from the others.

**Answers will vary but might include: its number is 6, it is turquoise, it comes between 5 and 7, it is 1 less than 7 and 1 more than 5, it is less than 20 but more than 3.**
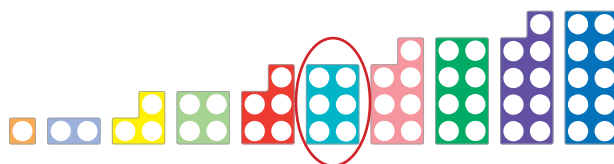
NPC Milestone 1:1d

**Answers are in bold.**

| 9 | 10 |
|---|---|

**9**

**Preparation:** Put on a table some number rods, Numicon Shapes, counters and a 9 number card.

Show the 9 card.

## Which number is this?

9

## Can you use the things on the table to show this number?

**Children should recognize the number 9. They may represent this in different ways, e.g. with a blue rod.**

**10**
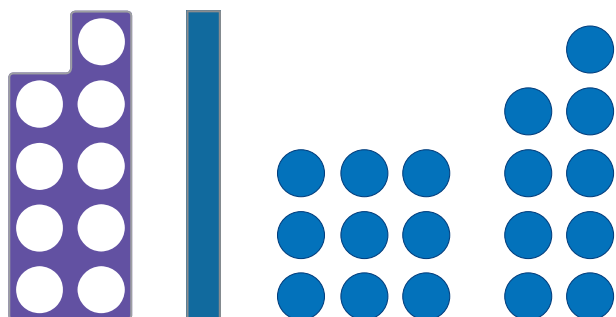
**Preparation:** Provide a pot of counters or Numicon Pegs and a 7 number card.

Show the 7 card.

## Which number is this?

7

## Can you show me the Numicon Shape pattern for 7?

**Children can build the pattern using counters or pegs.**

NPC Milestone 1:1e

NPC Milestone 1:1e

Answers are in bold.

| | |
|---|---|
| **11** | **12** |

**11**

How far can you count?

Can you count for me starting at 1?

**The counting range will vary from child to child. You may need to encourage them to go further. Ensure that children say the numbers in the correct order and that they pronounce the 'teen' and 'ty' correctly.**

NPC Milestone 1:1f

**12**

Can you count backwards?

What is the largest number you can count back from?

Can you show me?

**The counting range will vary from child to child. You may need to encourage them to start with a lower number if they make mistakes. Ensure that the numbers are in the correct order and that the 'teen' and 'ty' are distinguishable.**

NPC Milestone 1:1f

**13**

**Preparation:** Put 24 Numicon Pegs on a tabletop in a pile. You could use alternative objects for counting.

Can you count how many pegs are on the table?

**Check that children can accurately count that there are 24 pegs, using one-to-one correspondence.**

NPC Milestone 1:1g

**14**

**Preparation:** Put at least 50 counters in a pot.

Can you take 30 counters from the pot?

Count as you take them out and stop when you get to 30.

**Check that children can accurately count out exactly 30 counters, using one-to-one correspondence.**

NPC Milestone 1:1g

**Numicon Milestone Assessment – NPC 1 Milestone 2 (Pupil)**
Answers are on the answer pages that follow.

**1**

## Which shape does not belong in this set?

## Can you explain why?

NPC Milestone 1:2a

**2**

## Can you make a set of pencils?

NPC Milestone 1:2a

**3**

## Listen to my pattern:

Knock, knock, knock, clap, clap, knock, knock, knock, clap, clap.

## Can you make my pattern using pegs?

## Can you find the number cards to match?

NPC Milestone 1:2b

**4**

## Can you use the number cards to make a repeating pattern?

## Can you use cubes to show the pattern?

NPC Milestone 1:2b

**Number, Pattern and Calculating 1**

**5**

Can you read these numbers for me, starting from here?

Now can you read them starting from here?

Can you read them now?

NPC Milestone 1:2c

**6**

Can you read this number?

Can you use the Numicon Shapes to show this number?

NPC Milestone 1:2c

**7**

I'm going to say some number names.

Can you write each number in numerals?

NPC Milestone 1:2d

**8**

Can you use the number rods to show me 17, 13, 11, 15, 12?



1 2 3 4 5 6 7 8 9 10

NPC Milestone 1:2d

**9**

Spin the spinner.

Can you make that Shape using two other Numicon Shapes?

**10**

Choose two Numicon Shapes from the bag.

Now can you find the Shape that your two Numicon Shapes make?

**11**

I have 5 apples and 3 bananas.

How many pieces of fruit do I have altogether?

Can you show me with the Numicon Shapes?

Can you tell me the number sentence?

**12**

Molly has 4 red cars and 2 blue cars.

How many cars does she have altogether?

Can you show me with the pegs?

Can you tell me the number sentence?

**13**

How can I find out
how many pegs there are?

**14**

Ben has 2 balloons.

Tia has 6 balloons.

How can you find out
how many balloons they
have altogether?

NPC Milestone 1:2g

NPC Milestone 1:2g

**Answers are in bold.**

| | |
|---|---|
| **1** | **2** |

**1**

Preparation: Set up a sorting hoop containing different shapes, similar to the illustration.

Which shape does not belong in this set?

Can you explain why?
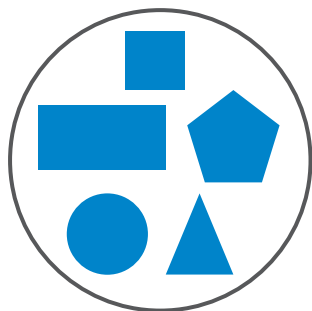


**Explanations will vary, e.g. the circle as it has a curved side.**

NPC Milestone 1:2a

**2**

Preparation: Provide a sorting hoop and a selection of pencils and crayons.

Can you make a set of pencils?

**Use your professional judgement to determine whether the child is accurate with this question.**

NPC Milestone 1:2a

**Answers are in bold.**

## 3

**Preparation:** Sort a selection of Numicon Pegs into pots of the same colour. Use two different colours. Provide two sets of 'Numeral Cards 0–10' cut out from photocopy master 9.

Listen to my pattern:

Make the sound pattern by knocking on a table and clapping your hands.

> Knock, knock, knock, clap, clap, knock, knock, knock clap, clap.

Can you make my pattern using pegs?

Can you find the number cards to match?

**Answers should match the pattern you create, e.g.**

**3  2  3  2**

**3  2  3  2**
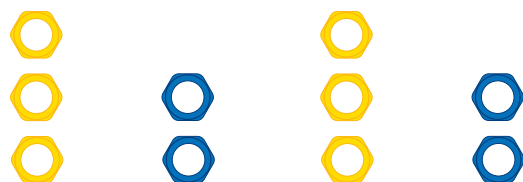
## 4

**Preparation:** Put some cubes into pots of the same colour. Provide three sets of 'Numeral Cards 0–10' cut out from photocopy master.
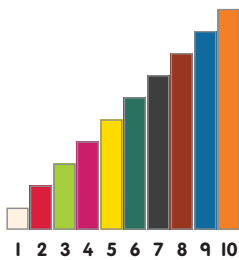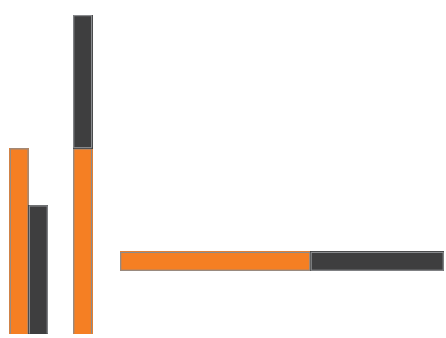
Can you use the number cards to make a repeating pattern?

Can you use cubes to show the pattern?

**Answers will vary but must include a repeating element with a model that matches the numerals.**
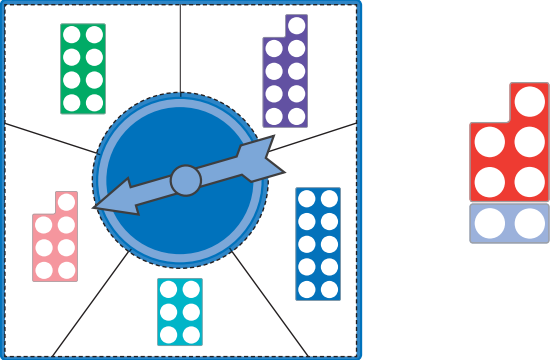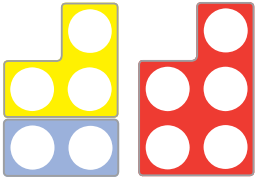
**Answers are in bold.**

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**5**

**Preparation:** Put Numeral Cards 11–19 on a table, in order.

Point to 11.

Can you read these numbers for me, starting from here?

Point to 19.

Now can you read them starting from here?

Jumble up the cards to a random arrangement.

Can you read them now?

**Ensure that children enunciate the 'teen' clearly.**

NPC Milestone 1:2c

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**6**

**Preparation:** Provide a set of Numicon Shapes and Numeral Cards 11–19. Place the cards in a random order face down on a tabletop.

Turn over the first card.

Can you read this number?

Can you use the Numicon Shapes to show this number?

Work through the pile of cards with the child, changing each representation into the new number.

**Ensure that children enunciate the 'teen' clearly. Look for children who spot that they are just changing the 'ones' Numicon Shape.**

NPC Milestone 1:2c

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**7**

**Preparation:** Provide a whiteboard and pen or paper and pencil.

I'm going to say some number names.

Can you write each number in numerals?

Say the numbers 11–19 in a random order.

**Numerals 11–19 written in the order they were said.**

NPC Milestone 1:2d

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**8**

**Preparation:** Provide a set of number rods.

Can you use the number rods to show me 17, 13, 11, 15, 12?



**Rods can be presented in any of the following formats.**



NPC Milestone 1:2d

---

**Answers are in bold.**

**9**

**Preparation:** Provide a set of Numicon Shapes and a Numicon Spinner with overlay of Numicon Shapes 6–10 from photocopy master 20, 'Spinner Overlays'.

Spin the spinner.

Can you make that Shape using two other Numicon Shapes?

**Answers will vary. Some children may put the single Numicon Shape over the top to check the total.**

NPC Milestone 1:2e

**10**

**Preparation:** Put Numicon Shapes 1–5 into a Numicon Feely Bag.

Choose two Numicon Shapes from the bag.

Now can you find the Shape that your two Numicon Shapes make?

**Answers will vary, e.g. children might select the 2-shape and 3-shape and show the 5-shape.**

NPC Milestone 1:2e

**11**

**Preparation:** Provide a set of Numicon Shapes and other objects used for counting.

I have 5 apples and 3 bananas.

How many pieces of fruit do I have altogether?

Can you show me with the Numicon Shapes?

Can you tell me the number sentence?

**Sentences may vary, e.g. 5 apples and 3 bananas make 8 pieces of fruit.**

NPC Milestone 1:2f

**12**

**Preparation:** Provide a set of Numicon Pegs and other objects used for counting.

Molly has 4 red cars and 2 blue cars.

How many cars does she have altogether?

Can you show me with the pegs?

Can you tell me the number sentence?

**Sentences may vary, e.g. 4 cars and 2 cars make 6 cars altogether.**

NPC Milestone 1:2f

**Answers are in bold.**

| 13 | 14 |
|---|---|
| **Preparation:** Provide some Numicon Pegs, Numicon Shapes and a Numicon Baseboard. Set up five blue Pegs and four yellow Pegs as shown.<br><br>How can I find out how many pegs there are?<br><br><br><br>**Explanations will vary, e.g. children may say you could count them initially. If so, ask if they could find the total a different way. They may then suggest that you can add them together.** | Ben has 2 balloons.<br><br>Tia has 6 balloons.<br><br>How can you find out how many balloons they have altogether?<br><br><br><br>**Explanations may vary but children should suggest that the two numbers need to be added together. They might go on to give the answer, e.g. 2 add 6 makes 8.** |
| NPC Milestone 1:2g | NPC Milestone 1:2g |
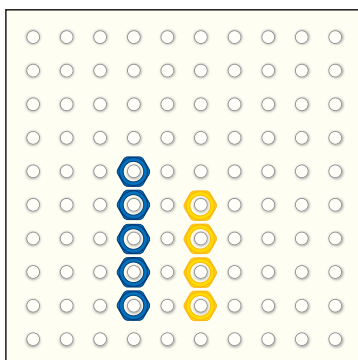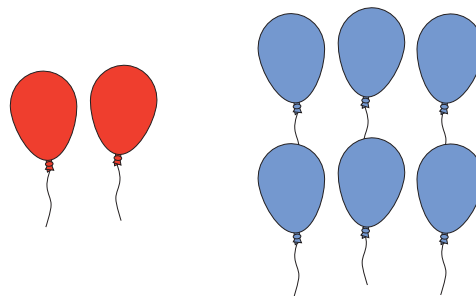
**1**

There are 10 birds
in the garden.

4 birds fly away.

How many birds are left?

Use the pegs or Numicon
Shapes to help you.

Can you tell me the
number sentence?

NPC Milestone 1:3a

**2**

I have 7 sweets.

If I eat 3 sweets, how many
sweets will I have left?

Can you tell me the
number sentence?

NPC Milestone 1:3a

**3**

Can you tell me the two
Numicon Shapes that are
in the bag?

Can you find me the
Numicon Shape that is the
difference between them?

NPC Milestone 1:3b

**4**

Watch what I do.

Can you tell me the
number sentence?

NPC Milestone 1:3b

**5**

Using any of these things, can you show me 6?

Can you show me 6 in other ways?

NPC Milestone 1:3c

**6**

Can you tell me the difference between the number of red pegs and the number of yellow pegs?

NPC Milestone 1:3c

**7**

Spin each spinner.

Can you make a number sentence using the number and word cards?

You can use the Numicon Shapes to help you.

NPC Milestone 1:3d

**8**

Can you make a number sentence using the words and rods?
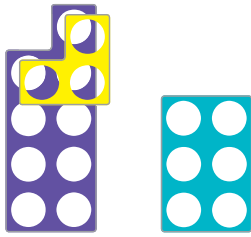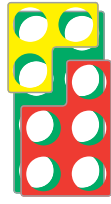
Now can you read your sentence?

NPC Milestone 1:3d

**Answers are in bold.**

**1**

**Preparation:** Provide some Numicon Pegs, Numicon Shapes and a Numicon Baseboard.

There are 10 birds in the garden.

4 birds fly away.

How many birds are left?

Use the pegs or Numicon Shapes to help you.

Can you tell me the number sentence?

**Sentences may vary, e.g. 10 take away 4 leaves 6.**

NPC Milestone 1:3a

**2**

**Preparation:** Provide some Numicon Pegs, Numicon Shapes and a Numicon Baseboard.

I have 7 sweets.

If I eat 3 sweets, how many sweets will I have left?

Can you tell me the number sentence?

**Sentences may vary, e.g. 7 sweets take away 3 sweets leaves 4 sweets.**

NPC Milestone 1:3a

**3**

**Preparation:** Provide a full set of Numicon Shapes but put the 9-shape and 3-shape into a Numicon Feely Bag.

Can you tell me the two Numicon Shapes that are in the bag?

Can you find me the Numicon Shape that is the difference between them?

**Children might overlap the two Shapes to show the difference: a 6-shape.**



NPC Milestone 1:3b

**4**

**Preparation:** Lay out an 8-shape with a 3-shape and a 5-shape on top.

Watch what I do.

Take the 3-shape away.

Can you tell me the number sentence?

**Sentences may vary but should explain that 8 take away 3 leaves 5.**



NPC Milestone 1:3b

**Answers are in bold.**

---

**5**

**Preparation:** Provide a range of concrete resources, e.g. Numicon Pegs, rods, counters, cubes, straws and Numicon Shapes.

Using any of these things, can you show me 6?

Can you show me 6 in other ways?

**Use your professional judgement to determine whether the child is accurate with this question.**

NPC Milestone 1:3c

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**6**

**Preparation:** On a Numicon Baseboard, randomly place 9 red Numicon Pegs and 4 yellow Numicon Pegs.

Can you tell me the difference between the number of red pegs and the number of yellow pegs?

Children can reorder the Numicon Pegs if they wish.

**Explanations will vary to find a difference of 5.**

NPC Milestone 1:3c

---

**7**

**Preparation:** Cut out the cards from 'Words and Symbols for Calculating', 'Words for Calculating' and 'Numeral Cards 0–10' (photocopy masters 24a, 24b and 9). Provide Numicon Shapes and two Numicon Spinners with 1–5 Overlays from photocopy master 20, 'Spinner Overlays'.

Spin each spinner.

Can you make a number sentence using the number and word cards?

You can use the Numicon Shapes to help you.

**Answers will vary, e.g. if the spinners land on 5 and 4:**
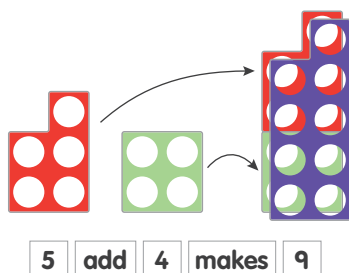
| 5 | add | 4 | makes | 9 |

NPC Milestone 1:3d

---

**8**

**Preparation:** Cut out the cards from 'Words and Symbols for Calculating', 'Words for Calculating' and 'Numeral Cards 0–10' (photocopy masters 24a, 24b and 9). Provide number rods.

Can you make a number sentence using the words and rods?

Now can you read your sentence?

**Answers will vary, e.g.**
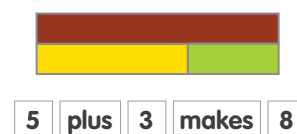
| 5 | plus | 3 | makes | 8 |

NPC Milestone 1:3d

---

**1**

Can you use the counters or cubes to make three number stories that use the word 'fewer'?

Can you use the counters or cubes to make a story that uses the word 'fewest'?

NPC Milestone 1:4a

**2**

Can you use the Numicon Shapes and the pan balance to show me three 'equal to' number stories?

NPC Milestone 1:4a

**3**

Look at the pan balance.



What can you tell me about the number rods?

Can you use the words and symbols on the cards to help you?

NPC Milestone 1:4b

**4**

Use these symbols and the Numicon Shapes in the bag.

Can you make some number stories?

NPC Milestone 1:4b

**5**

Can you make three adding sentences?

Use the number rods and the cards.

NPC Milestone 1:4c

**6**

Can you use the Numicon Shapes and symbols to make some number sentences?

NPC Milestone 1:4c

**7**

Can you find three different ways to make 9p?

You can use the coins and Numicon Shapes to help you.

NPC Milestone 1:4d

**8**

I want to take one coin of each type from this pile.

How much money will I have?

You can use the coins and Numicon Shapes to help you.

NPC Milestone 1:4d

**9**

## Can you tell me about the pattern you can see here?



NPC Milestone 1:4e

**10**

## Can you tell me which number sentences are missing from this pattern?

$$10 - 2 = 8$$
$$7 - 2 = 5$$
$$6 - 2 = 4$$
$$5 - 2 = 3$$

NPC Milestone 1:4e

**11**

## Can you put the cards in order?

## Start at 0.

NPC Milestone 1:4f

**12**

## Can you put the cards in order from 20 to 10?

NPC Milestone 1:4f

**13**

Can you show me how to find the difference between 10 and 6?

Use the Numicon Shapes.

NPC Milestone 1:4g

**14**

Can you show me how to take away 3 from 8?

Use the Numicon Shapes.

NPC Milestone 1:4g

**15**

Can you make number sentences for these Numicon Shapes?



Use the number cards and symbols to help you.

NPC Milestone 1:4h

**16**
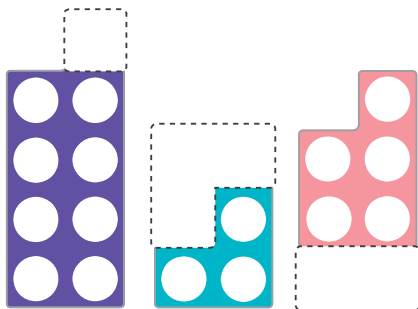
Can you read and check my number sentences?

$$6 - 4 = 2$$
$$5 = 8 - 3$$
$$8 - 1 = 9$$

NPC Milestone 1:4h

**Answers are in bold.**

---

**1**

**Preparation:** Provide some counters and cubes.

Can you use the counters or cubes to make three number stories that use the word 'fewer'?

Can you use the counters or cubes to make a story that uses the word 'fewest'?

**Use your professional judgement to determine whether the child is accurate with this question.**

is fewer than

**Tia     Ravi     Ben**
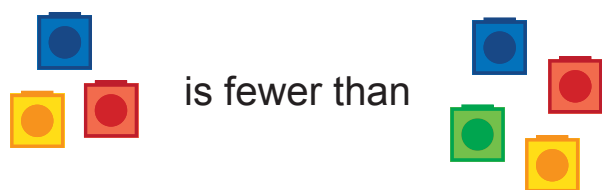
Ben has the fewest counters.

NPC Milestone 1:4a

---

**2**

**Preparation:** Provide some Numicon Shapes and a Numicon Pan Balance.

Can you use the Numicon Shapes and the pan balance to show me three 'equal to' number stories?

**Answers will vary, e.g.**
**8 and 2 is equal to 10.**
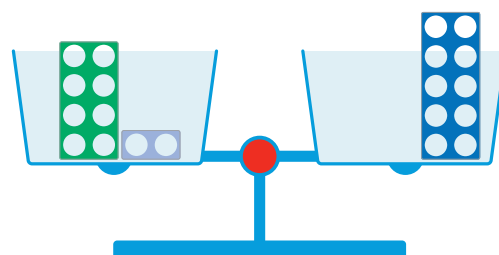
NPC Milestone 1:4a

---

**Answers are in bold.**

---

**3**

**Preparation:** Cut out the cards from 'Words and Symbols for Calculating' and 'Words for Comparing Measures' (photocopy masters 24a and 25). Using a Numicon Pan Balance, place a 7 number rod in the left-hand pan and a 9 number rod in the right-hand pan.

Look at the pan balance.
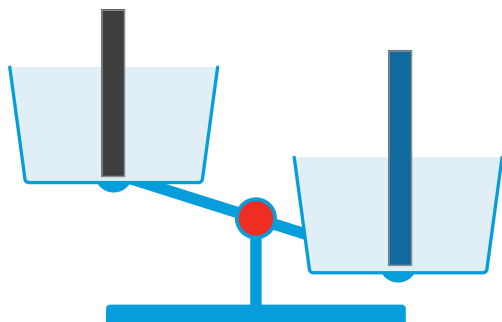


What can you tell me about the number rods?

Can you use the words and symbols on the cards to help you?

**Multiple answers are possible, e.g. black is shorter than blue, blue is longer than black, black < blue. Look for children who use 'so': blue is heavier than black, so black is lighter than blue.**

---

**4**

**Preparation:** Cut out the comparison symbols from 'Words and Symbols for Calculating' (photocopy master 24a) and lay these face up on a tabletop. Put two each of 4-, 5- and 9-shapes into a Numicon Feely Bag.

Use these symbols and the Numicon Shapes in the bag.

Can you make some number stories?

**Answers may vary but will include:**

**4 < 5, 4 < 9,**

**5 < 9, 5 > 4,**

**9 > 5, 9 > 4.**

---

**Answers are in bold.**

| | |
|---|---|
| **5** | **6** |

Can you make three adding sentences?

Use the number rods and the cards.

**Answers will vary, e.g.**

$$7 = 6 + 1$$

$$3 + 4 = 7$$

$$9 = 5 + 4$$

NPC Milestone 1:4c

Can you use the Numicon Shapes and symbols to make some number sentences?

**Answers will vary, e.g.**

$$9 = 6 + 3$$

$$9 - 3 = 6$$
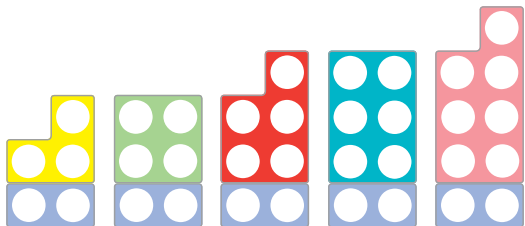
NPC Milestone 1:4c

**Answers are in bold.**

---

**7**

**Preparation:** Provide Numicon Shapes and multiple sets of coins: 1p, 2p and 5p.

Can you find three different ways to make 9p?

You can use the coins and Numicon Shapes to help you.

> **Answers must total 9p, e.g.**
> **5p + 2p + 2p**
> **2p + 2p + 2p + 2p + 1p**
> **5p + 1p + 1p + 1p + 1p**

NPC Milestone 1:4d

---

**8**

**Preparation:** Provide Numicon Shapes and a pile of 1p, 2p and 5p coins. Point to the pile of coins.

I want to take one coin of each type from this pile.

How much money will I have?

You can use the coins and Numicon Shapes to help you.

> **5p + 2p + 1p = 8p**

NPC Milestone 1:4d

---

**9**

**Preparation:** Set out Numicon Shapes as shown below.

Can you tell me about the pattern you can see here?



**Explanations may vary, but children should see that the numbers are increasing in order and by 1 each time.**

NPC Milestone 1:4e

---

**10**

**Preparation:** Write on the board the number sentences below.

Can you tell me which number sentences are missing from this pattern?

> $10 - 2 = 8$
> $7 - 2 = 5$
> $6 - 2 = 4$
> $5 - 2 = 3$

**Children might finish the pattern, e.g. $4 - 2 = 2$, $3 - 2 = 1$, $2 - 2 = 0$. They should also notice that $9 - 2 = 7$ and $8 - 2 = 6$ are missing.**

NPC Milestone 1:4e

---

**Answers are in bold.**

| | |
|---|---|
| **11** | **12** |
| **Preparation:** Shuffle a set of 'Numeral Cards 0–20' cut from photocopy master 10. | **Preparation:** Shuffle a set of number cards 10–20, cut from 'Numeral Cards 0–20', photocopy master 10. |
| Can you put the cards in order? | Can you put the cards in order from 20 to 10? |
| Start at 0. | **Cards ordered from 20–10.** |
| **Cards ordered from 0–20.** | |
| NPC Milestone 1:4f | NPC Milestone 1:4f |
| **13** | **14** |
| **Preparation:** Provide Numicon Shapes, Numicon Pegs and 'Subtracting Covers' cut from photocopy master 21. | **Preparation:** Provide Numicon Shapes, Numicon Pegs and 'Subtracting Covers' cut from photocopy master 21. |
| Can you show me how to find the difference between 10 and 6? | Can you show me how to take away 3 from 8? |
| Use the Numicon Shapes. | Use the Numicon Shapes. |
| **Children may overlay Numicon Shapes, use subtracting covers or Numicon Pegs, or know the 'fact family' to find the answer: 4.** | **Children may overlay Numicon Shapes, use subtracting covers or Numicon Pegs, or know the 'fact family' to find the answer: 5.** |
| NPC Milestone 1:4g | NPC Milestone 1:4g |

**15**

## Can you make number sentences for these Numicon Shapes?

## Use the number cards and symbols to help you.

$$9 - 1 = 8$$
$$6 - 3 = 3$$
$$7 - 2 = 5$$

NPC Milestone 1:4h

**16**

## Can you read and check my number sentences?

$$6 - 4 = 2$$
$$5 = 8 - 3$$
$$8 - 1 = 9$$

**Explanations may vary but must include that the third one is incorrect and should be 8 – 1 = 7.**

NPC Milestone 1:4h

**1**

# Can you show me four oblongs in this classroom?

GMS Milestone 1:1a

**2**

# Can you show me a circle, a triangle and a square in this classroom?

GMS Milestone 1:1a

**3**

# Choose two shapes from the bag.

# Can you tell me what is different about the two shapes?

GMS Milestone 1:1b

**4**

# Can you sort the shapes into three different groups?

# Can you tell me why you grouped them in that way?

GMS Milestone 1:1b

**5**

## Can you find all the squares?

GMS Milestone 1:1c

**6**

## Can you find all the triangles?

GMS Milestone 1:1c

**7**

## Which ribbon do you think is the longest?

## How can you check if you are correct?

GMS Milestone 1:1d

**8**

## Can you put these rods in order, from shortest to longest?

GMS Milestone 1:1d

**9**

Can you measure your maths book?

What will you use and why?

**10**

Can you measure the length of the table?

Can you measure the height of the chair?

What will you use and why?

**11**

Hattie measured her book with a piece of paper.

She said it was 6 pieces of paper long.

Charlie said it was only 3 pieces of paper long.

| Book |
| Paper |
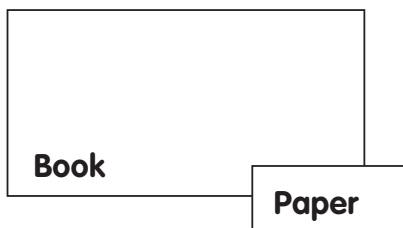
Who do you think is right?

**12**

Ravi needs a piece of ribbon that is 15 cubes long.

He picks this one.

Do you think he is right?

**13**

Can you show me the Numicon Shapes that are equal to 1p, 2p and 5p?

Can you show me how many 1p coins are equal to 2p?

How many 1p coins are equal to 5p?

GMS Milestone 1:1g

**14**

Can you show me the Numicon Shape that is equal to 10p?

Can you show me how many 1p, 2p and 5p coins are equal to 10p?

GMS Milestone 1:1g

**15**

Can you find three different ways of using the coins to make 15p?

GMS Milestone 1:1h

**16**

Can you use the coins to make three different amounts?

Use four coins each time.

GMS Milestone 1:1h

**17**

Can you tell me about five things you have done today?

Can you tell me them in the order they happened?

**18**

Can you put these things in the order we do them?

Start with the beginning of the week.

Can you think of something we always do on Monday?

**19**

Can you tell me the names of the days of the week in order, starting with Monday?

**20**

Can you tell me the names of the months of the year in order, starting with January?

| 21 | 22 |
|---|---|
| Can you think of something that usually lasts an hour?<br><br>What might take about a minute? | How long do you think it will take you to put your coat on?<br><br>I will time you.<br><br>Were you right? |
| GMS Milestone 1:1k | GMS Milestone 1:1k |

**Answers are in bold.**

**1**

**Preparation:** Make sure there is a variety of oblongs in the classroom so children can find at least four to identify.

Can you show me four oblongs in this classroom?

**Answers will vary. Make sure children understand the difference between a square and an oblong.**

GMS Milestone 1:1a

**2**

**Preparation:** Make sure there is a variety of shapes in the classroom for children to find and identify, including a circle, a triangle and a square.

Can you show me a circle, a triangle and a square in this classroom?

**Answers will vary. Make sure children understand the difference between a square and an oblong.**

GMS Milestone 1:1a

**3**

**Preparation:** Put one each of: square, oblong, equilateral triangle, circle in a Numicon Feely Bag.

Choose two shapes from the bag.

Can you tell me what is different about the two shapes?

**Answers will vary, e.g. the triangle has three sides but the square has four sides.**

GMS Milestone 1:1b

**4**

**Preparation:** Provide three different sizes each of these shapes: square, oblong, equilateral triangle, circle.

Can you sort the shapes into three different groups?

Can you tell me why you grouped them in that way?

**Answers will vary. Ideally the grouping decisions will be linked to the corners and sides. If children group them by size, encourage them to try to find another way to sort them.**

GMS Milestone 1:1b

**Answers are in bold.**

---

**5**

**Preparation:** Provide five or six different sizes each of: square, oblong, triangle, circle, arranged on a tabletop in different orientations.

Can you find all the squares?

**All squares are identified, including those in unfamiliar orientations.**

GMS Milestone 1:1c

---

**6**

**Preparation:** Provide five or six different sizes each of: square, oblong, triangle, circle, arranged on a tabletop in different orientations.

Can you find all the triangles?

**All triangles are identified, including those in unfamiliar orientations.**

GMS Milestone 1:1c

---

**7**

**Preparation:** Scrunch up some ribbons of different lengths and widths and place them on a tabletop.

Which ribbon do you think is the longest?

How can you check if you are correct?

**Methods will vary, e.g. some children will compare all the lengths together; others might compare them two at a time.**

GMS Milestone 1:1d

---

**8**

**Preparation:** Prepare some number rods, as shown below. Use adhesive tack to stick the rods together.

Can you put these rods in order, from shortest to longest?



**Strategies may vary, but the rods will need to be aligned at the same starting point.**

GMS Milestone 1:1d

---

**Answers are in bold.**

---

**9**

**Preparation:** Provide a selection of items that could be used as non-standard measures, e.g. a long length of string, number rods, a tower of 10 interlocking cubes, paperclips, etc.

Can you measure your maths book?

What will you use and why?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:1e

---

**10**

**Preparation:** Provide a selection of items that could be used as non-standard measures, e.g. a long length of string, number rods, a tower of 10 interlocking cubes, paperclips, etc.

Can you measure the length of the table?

Can you measure the height of the chair?

What will you use and why?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:1e

---

**11**

**Preparation:** Provide a maths book and an oblong of paper that supports the problem.

Hattie measured her book with a piece of paper.

She said it was 6 pieces of paper long.

Charlie said it was only 3 pieces of paper long.

**Book** **Paper**

Who do you think is right?

**Explanations will vary but there should be an acknowledgement that they used the paper differently.**

GMS Milestone 1:1f

---

**12**

**Preparation:** Provide 15 interlocking cubes and various lengths of ribbon: one the length of 15 cubes, other pieces shorter than this and other pieces longer than this.

Ravi needs a piece of ribbon that is 15 cubes long.

He picks this one.

Point to a piece of ribbon that is just too short.

Do you think he is right?

**Explanations should refer to the ribbon being too short or not measured accurately.**

GMS Milestone 1:1f

---

**Answers are in bold.**

---

**13**

**Preparation:** Provide some plastic 1p coins and a set of Numicon Shapes.

Can you show me the Numicon Shapes that are equal to 1p, 2p and 5p?

**1-shape, 2-shape, 5-shape**

Can you show me how many 1p coins are equal to 2p? **2**

How many 1p coins are equal to 5p? **5**

**Some children may place the coins on the Numicon Shapes to find the answer.**



GMS Milestone 1:1g

---

**14**

**Preparation:** Provide some plastic 1p, 2p and 5p coins and a set of Numicon Shapes.

Can you show me the Numicon Shape that is equal to 10p?

**10-shape**

Can you show me how many 1p, 2p and 5p coins are equal to 10p?

**Some children may place the coins on the Numicon Shapes to find the answer.**



GMS Milestone 1:1g

---

**15**

**Preparation:** Provide a collection of plastic coins, including at least 15 × 1p, 8 × 2p, 4 × 5p, 2 × 10p, 1 × 20p, 1 × 50p, 1 × £1 and 1 × £2.

Can you find three different ways of using the coins to make 15p?

**Various answers that total 15p, e.g. 10p + 5p, 5p + 5p + 5p, 15 × 1p.**

GMS Milestone 1:1h

---

**16**

**Preparation:** Provide children with plastic 1p and 2p coins (at least 15 of each).

Can you use the coins to make three different amounts?

Use four coins each time.

**Answers range between 4p and 8p, e.g.**
**1p + 1p + 1p + 1p = 4p**
**2p + 1p + 1p + 1p = 5p**
**2p + 2p + 1p + 1p = 6p**

GMS Milestone 1:1h

---

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Answers are in bold.

---

**17**

Can you tell me about five things you have done today?

Can you tell me them in the order they happened?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:1i

---

**18**

**Preparation:** Write on individual cards some key events from your school week. You may read these out if necessary.

Can you put these things in the order we do them?

Start with the beginning of the week.

Can you think of something we always do on Monday?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:1i

---

**19**

**Preparation:** Cut out the 'Days of the Week Cards' from photocopy master 4, if needed for support.

Can you tell me the names of the days of the week in order, starting with Monday?

**Monday to Sunday.**

GMS Milestone 1:1j

---

**20**

**Preparation:** Cut out the 'Months of the Year Cards' from photocopy master 12, if needed for support.

Can you tell me the names of the months of the year in order, starting with January?

**January to December.**

GMS Milestone 1:1j

---

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**Answers are in bold.**

| 21 | 22 |
|---|---|
| Can you think of something that usually lasts an hour?<br><br>What might take about a minute?<br><br>**Use your professional judgement to determine whether the child is accurate with this question.** | **Preparation:** Provide equipment to measure time in seconds, e.g. a stopwatch or sand timer.<br><br>How long do you think it will take you to put your coat on?<br><br>I will time you.<br><br>Were you right?<br><br>**Use your professional judgement to determine whether the child is accurate with this question.** |
| GMS Milestone 1:1k | GMS Milestone 1:1k |

**1**

Can you add 3 to each Numicon Shape?

First, sort the Numicon Shapes into a good order.

Why did you choose to order them like this?

**2**

Can you sort these number sentences into a good order?

Why did you choose to order them like this?

**3**

Look at the number line.

19 20 21 22 23

Can you tell me which numbers are missing?

What patterns can you see in the numbers on the number line?

**4**

Can you tell me about the patterns in the numbers on this number line?
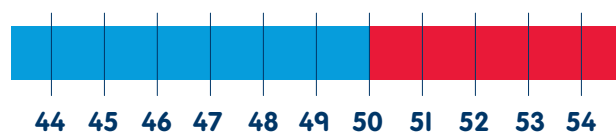
44 45 46 47 48 49 50 51 52 53 54

How does this help you to know the pattern in the next ten numbers?

**5**

How many pegs are on this board?

Can you tell me without counting?
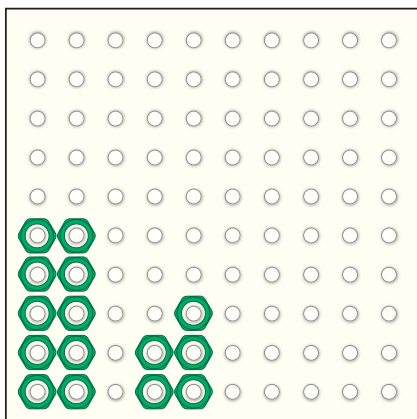


NPC Milestone 1:5c

**6**

How many fish are there?

Can you tell me without counting?
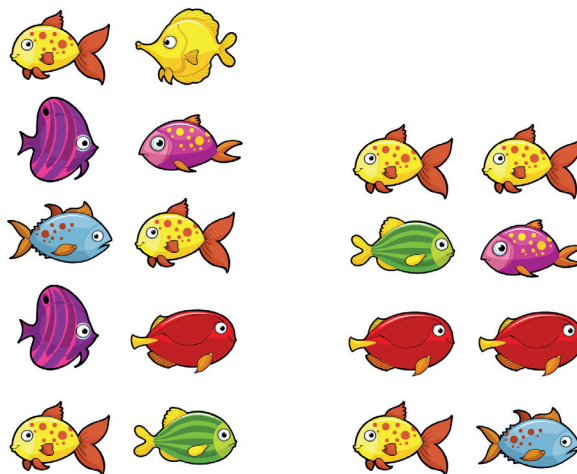


NPC Milestone 1:5c

**7**

Can you estimate how many pegs are on the board?
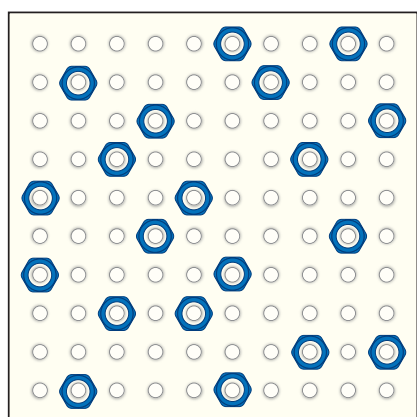


Can you count the pegs to check?

Were you right?

NPC Milestone 1:5d

**8**

Can you estimate how many counters there are on the paper?

Now try to count them.

How close was your estimate?

NPC Milestone 1:5d

**9**

Can you use these numbers to write some adding sentences?

Can you use these numbers to write some subtracting sentences?

Use 8 in each sentence you make.

| 8 | 8 | 0 | 1 | 2 | 3 |

| 4 | 4 | 5 | 6 | 7 |
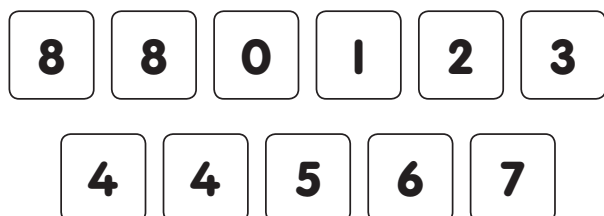
NPC Milestone 1:5e

**10**

Can you use the Numicon Shapes to show me some doubling number sentences?

NPC Milestone 1:5e

**11**

Can you use the cards to make some number sentences for this pan balance?
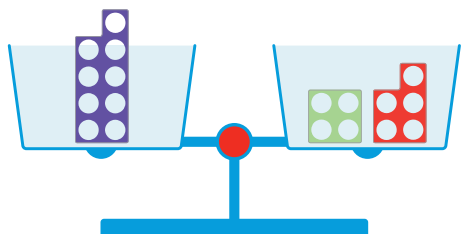


How many sentences do you think there will be?

NPC Milestone 1:5f

**12**

Can you cover half of the 6-shape with pegs?

How many pegs did you need?

Can you show double 3 using the Numicon Shapes?

What do you notice?

Can you find another pair of halves and doubles?

NPC Milestone 1:5f
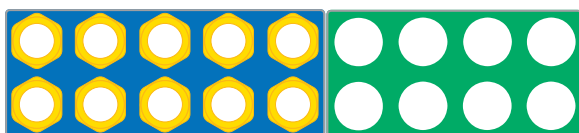
**13**

Max made this to show half of 18.
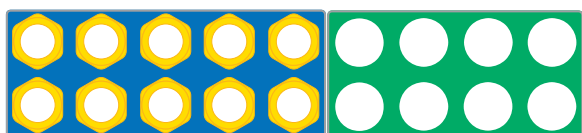


Do you think that this is right?

Why do you think that?

NPC Milestone 1:5g

**14**

Can you halve the counters for me?

What did you find out?

NPC Milestone 1:5g

**Answers are in bold.**

**1**

**Preparation:** Place Numicon Shapes 4 to 8 in a random order on a tabletop. Provide five 3-shapes.

Can you add 3 to each Numicon Shape?

First, sort the Numicon Shapes into a good order.

Why did you choose to order them like this?

**Explanations will vary, but look for children who put the numbers in order and work systematically.**

**4 + 3 = 7**
**5 + 3 = 8**
**6 + 3 = 9**
**7 + 3 = 10**
**8 + 3 = 11**

NPC Milestone 1:5a

**2**

**Preparation:** Shuffle the number sentence cards cut from 'Number Sentences for 7' (photocopy master 6).

Can you sort these number sentences into a good order?

Why did you choose to order them like this?

**Answers may vary, e.g. the child may order them by answers or subtrahends.**

NPC Milestone 1:5a

**Answers are in bold.**

---

**3**

**Preparation:** Have ready a copy of 'Number Line Section 19–30' (photocopy master 7).

Look at the number line.

19 20 21 22 23

Can you tell me which numbers are missing?

Write the numbers on the line as children say them.

What patterns can you see in the numbers on the number line?

**Explanations will vary. Children may talk about the tens number staying the same between 20 and 29 and the ones number increasing by 1 each time until you get to 29.**

NPC Milestone 1:5b

---

**4**

**Preparation:** Have ready a copy of 'Number Line Section 44–54' (photocopy master 8).

Can you tell me about the patterns in the numbers on this number line?

44 45 46 47 48 49 50 51 52 53 54
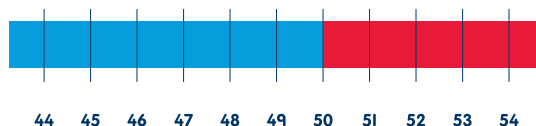
How does this help you to know the pattern in the next ten numbers?

**Explanations will vary, but should include the patterning of the ones digits and knowledge that this pattern repeats.**

NPC Milestone 1:5b

---

**Answers are in bold.**

**5**

**Preparation:** Arrange 15 Numicon Pegs of one colour on a Numicon Baseboard, grouped in a Numicon 10-pattern and a Numicon 5-pattern.

How many pegs are on this board?

Can you tell me without counting?
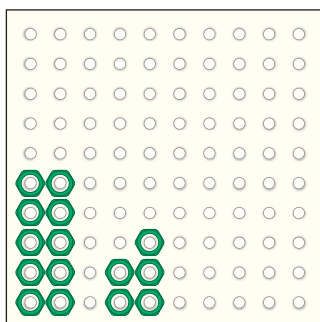
**15 without counting.**

NPC Milestone 1:5c

**6**

**Preparation:** Use the picture below, or set out 18 items grouped in a Numicon 10-pattern and a Numicon 8-pattern and ask children if they know how many there are without counting.

How many fish are there?

Can you tell me without counting?
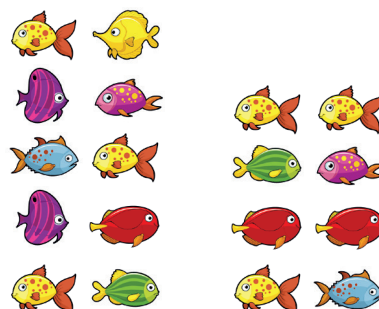
**18 without counting.**

NPC Milestone 1:5c

**7**

**Preparation:** Spread 20 Numicon Pegs of one colour randomly over a Numicon Baseboard.

Can you estimate how many pegs are on the board?
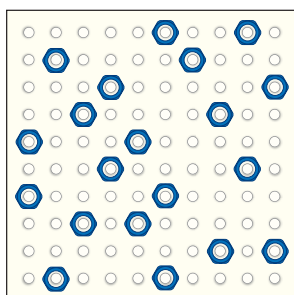
Can you count the pegs to check?

Were you right?

**There are 20 pegs in total. Look for reasonable estimates.**

NPC Milestone 1:5d

**8**

**Preparation:** Spread 14 counters of one colour over a piece of paper.

Can you estimate how many counters there are on the paper?

Now try to count them.

How close was your estimate?

**There are 14 counters in total. Look for reasonable estimates.**

NPC Milestone 1:5d

**Answers are in bold.**

**9**

**Preparation:** Provide a whiteboard and marker and Numeral Cards from 0 to 10 with the numbers shown below.

Can you use these numbers to write some adding sentences?

Can you use these numbers to write some subtracting sentences?

Use 8 in each sentence you make.

| 8 | 8 | 0 | 1 | 2 | 3 |

| 4 | 4 | 5 | 6 | 7 |

**Answers will vary, but should reflect children's knowledge of adding and subtracting facts for 8: 8 – 1 = 7 to 8 – 8 = 0 and 1 + 7 = 8 to 8 + 0 = 8. Not all children will work systemically.**

NPC Milestone 1:5e

**10**

**Preparation:** Provide two sets of Numicon Shapes.

Can you use the Numicon Shapes to show me some doubling number sentences?

**Answers will vary, e.g. 1 + 1 = 2, 10 + 10 = 20, 7 + 7 = 14.**

NPC Milestone 1:5e

**Answers are in bold.**

---

**11**

**Preparation:** Prepare a Numicon Pan Balance with a Numicon 9-shape in one pan and a 5- and a 4-shape in the other. Provide 4, 5 and 9 cards from 'Numeral Cards 0–10' and '+', '−' and '=' cards from 'Words and Symbols for Calculating' (photocopy masters 9 and 24a).

Can you use the cards to make some number sentences for this pan balance?
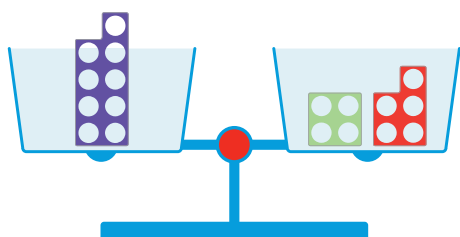
How many sentences do you think there will be?

**5 + 4 = 9**

**4 + 5 = 9**

**9 − 4 = 5**

**9 − 5 = 4**

NPC Milestone 1:5f

---

**12**

**Preparation:** Provide some Numicon Shapes and Numicon Pegs of the same colour.

Can you cover half of the 6-shape with pegs?

How many pegs did you need?

Can you show double 3 using the Numicon Shapes?

What do you notice?

Can you find another pair of halves and doubles?

**Explanations will vary.**
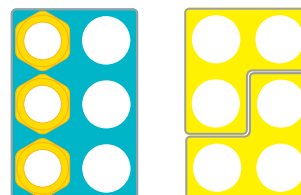
NPC Milestone 1:5f

---

**13**

**Preparation:** Use Numicon Shapes and Numicon Pegs to set up the example below.

Max made this to show half of 18.

Do you think that this is right?

Why do you think that?

**An explanation that acknowledges that there are too many pegs.**

NPC Milestone 1:5g

---

**14**

**Preparation:** Put 20 counters or Numicon Pegs of a single colour on a tabletop.

Can you halve the counters for me?

What did you find out?

**10. Half of 20 is 10.**

NPC Milestone 1:5g

---

**Number, Pattern and Calculating 1**

**1**

Choose three types
of shape.

Can you make a pattern
that fits together without
any gaps?

**2**

Can you make a large
triangle and a large square
out of smaller shapes?

Use as many shapes as
you need.

**3**

Can you copy this pattern
with the shapes?



Can you continue
the pattern?

**4**

Can you continue this
pattern?

**5**

Weigh these things.

Can you use the labels to show which is heavy, which is heavier and which is heaviest?

GMS Milestone 1:2c

**6**

Have I put these labels on the right boxes?

Can you check?

GMS Milestone 1:2c

**7**

Can you find something that looks as if it is heavy, but really it is light?

GMS Milestone 1:2d

**8**

Can you find something that looks as if it is light, but really it is heavy?

GMS Milestone 1:2d

**9**

Can you find out how many cubes weigh the same as each object?

Which object is the heaviest?

GMS Milestone 1:2e

**10**

Can you use the Numicon Shapes to balance the spoon?

Which Numicon Shape will you try first?

Why did you choose that Numicon Shape?

GMS Milestone 1:2e

**11**

Can you put water in a cup so it is half full?

Now can you show me a cup that is nearly full?

Can you explain how you knew how much water to put in each cup?

GMS Milestone 1:2f

**12**

Can you change the amount of water in each bottle to match its label?

GMS Milestone 1:2f

**13**

How many cups of water do you think you need to fill the large container?

Now try it.

Was it more or less than you thought?

GMS Milestone 1:2g

**14**

How many cups of water do you think you need to fill the container?

Now try it.

Was it more or less than you thought?

GMS Milestone 1:2g

**15**

How can you find out which container holds the most water?

What can you use to help you?

GMS Milestone 1:2h

**16**

Which bottle has the greater capacity?

Can you explain how you worked this out?

GMS Milestone 1:2h

**17**

Choose a 2D shape and a 3D shape.

Can you tell me some things that are different about these two shapes?

GMS Milestone 1:2i

**18**

Choose a 2D shape and a 3D shape.

How are they different?

Can you use these words to help you explain?

| edge | corner |
| curved | flat |
| straight | round |

GMS Milestone 1:2i

**19**

Can you find an object that would be good for the bottom of a tower?

Can you tell me why you chose that shape?

GMS Milestone 1:2j

**20**

Can you find an object that would be difficult to use for the bottom of a tower?

Can you explain why?

Are there any other shapes that would be difficult to use?

GMS Milestone 1:2j

**21**

Can you name this
3D shape?



GMS Milestone 1:2k

**22**
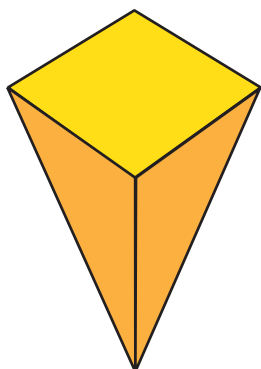
There is a 3D shape in
this bag.

It has faces that are either
squares or oblongs.

What shape could it be?

GMS Milestone 1:2k

**Answers are in bold.**

**1**

**Preparation:** Put on a tabletop some pattern blocks or shapes cut from the 'Pattern Blocks' (photocopy masters 14–19).

Choose three types of shape.

Can you make a pattern that fits together without any gaps?

**Answers will vary, e.g.**
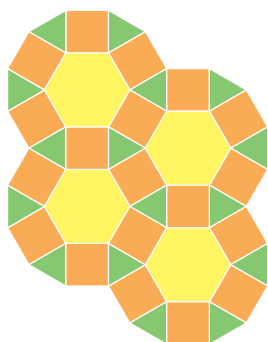
GMS Milestone 1:2a

**2**

**Preparation:** Put on a tabletop some pattern blocks or shapes cut from the 'Pattern Blocks' (photocopy masters 14–19).

Can you make a large triangle and a large square out of smaller shapes?

Use as many shapes as you need.

**Answers will vary, e.g.**
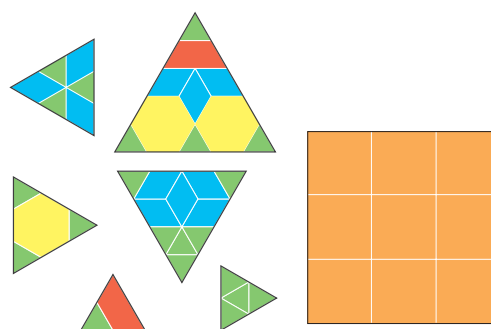
GMS Milestone 1:2a

**3**

**Preparation:** Put on a tabletop some pattern blocks or shapes cut from the 'Pattern Blocks' (photocopy masters 14–19).

Can you copy this pattern with the shapes?
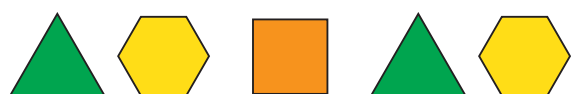
Can you continue the pattern?

**The continuation pattern may vary as shown.**
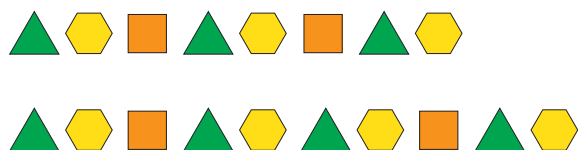
GMS Milestone 1:2b

**4**

**Preparation:** Arrange some pattern blocks or shapes cut from the 'Pattern Blocks' (photocopy masters 14–19) as shown.

Can you continue this pattern?

**Children should be encouraged to continue the pattern on both sides.**

GMS Milestone 1:2b

**Geometry, Measurement and Statistics 1**     © Oxford University Press 2019. This page can be copied for use in the purchasing school

**Answers are in bold.**

| 5 | |
|---|---|

**Preparation:** Put on a tabletop a Numicon Pan Balance and three small items for weighing that challenge the idea that large means heavy, e.g. an apple, a golf ball, a large packet of crisps. Also provide labels 'heavy', 'heavier', 'heaviest'.

Weigh these things.

Can you use the labels to show which is heavy, which is heavier and which is heaviest?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2c

| 6 | |
|---|---|

**Preparation:** Put on a tabletop a Numicon Pan Balance and three identical boxes that contain different concealed masses. Label the boxes incorrectly with labels 'heavy', 'heavier', 'heaviest'.

Have I put these labels on the right boxes?

Can you check?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2c

| 7 | |
|---|---|

**Preparation:** Provide a selection of objects: some that are large yet light; some that are small yet heavy, e.g. a tin of baked beans, a box of tissues, a mobile phone, a packet of ice cream cones.

Can you find something that looks as if it is heavy, but really it is light?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2d

| 8 | |
|---|---|

**Preparation:** Provide a selection of objects: some that are large yet light; some that are small yet heavy, e.g. a tin of baked beans, a box of tissues, a mobile phone, a packet of ice cream cones.

Can you find something that looks as if it is light but really it is heavy?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2d

**Answers are in bold.**

| 9 |
|---|

**Preparation:** Provide some interlocking cubes, a Numicon Pan Balance and two small items to compare that have a different mass, e.g. an apple and a toy car.

Can you find out how many cubes weigh the same as each object?

Which object is the heaviest?

**Explanations will vary, e.g. the apple is heavier as it balances with more cubes.**

GMS Milestone 1:2e

| 10 |
|---|

**Preparation:** Provide some Numicon Shapes, a Numicon Pan Balance and a small item, e.g. a spoon.

Can you use the Numicon Shapes to balance the spoon?

Which Numicon Shape will you try first?

Why did you choose that Numicon Shape?

**Explanations will vary, e.g. I chose the 10-shape as I think the spoon will be heavy.**

GMS Milestone 1:2e

| 11 |
|---|

**Preparation:** Provide some clear plastic cups and some water in a trough or bucket.

Can you put water in a cup so it is half full?

Now can you show me a cup that is nearly full?

Can you explain how you knew how much water to put in each cup?

**Explanations will vary, e.g. nearly full is not quite full, so it needs to be more than half but less than full.**

GMS Milestone 1:2f

| 12 |
|---|

**Preparation:** Provide some different-sized bottles labelled 'empty', 'half full', 'nearly full' and 'full' and some water in a trough or bucket.

Half fill the bottles with water.

Can you change the amount of water in each bottle to match its label?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2f

**Geometry, Measurement and Statistics 1**

**Answers are in bold.**

---

**13**

**Preparation:** Provide a small cup, a tall container approximately 10 times the capacity of the cup and some water in a trough or bucket.

How many cups of water do you think you need to fill the large container?

Now try it.

Was it more or less than you thought?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2g

---

**14**

**Preparation:** Provide a shallow container, a small cup and some water in a trough or bucket.

How many cups of water do you think you need to fill the container?

Now try it.

Was it more or less than you thought?

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:2g

---

**15**

**Preparation:** Provide two different-sized containers filled to the top with water, and other smaller containers, e.g. jugs, bowls or cups.

How can you find out which container holds the most water?

What can you use to help you?

**Explanations will vary, but children should realize that to compare the containers they need to use the same measure.**

GMS Milestone 1:2h

---

**16**

**Preparation:** Provide two empty bottles of different sizes, some small cups, beakers and water in a trough or bucket.

Which bottle has the greater capacity?

Can you explain how you worked this out?

**Explanations will vary, but children should realize that to compare the containers they need to use the same measure.**

GMS Milestone 1:2h

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**Geometry, Measurement and Statistics  1**         © Oxford University Press 2019. This page can be copied for use in the purchasing school
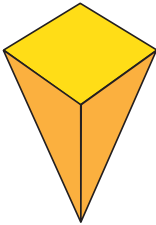
Answers are in bold.

**17**

**Preparation:** Put on a tabletop a selection of 2D shapes (squares, oblongs, triangles and circles) and some 3D shapes (cubes, cuboids and pyramids).

Choose a 2D shape and a 3D shape.

Can you tell me some things that are different about these two shapes?

**Answers will vary, e.g. one is 2D and one is 3D; one is flat and has sides, the other has faces and edges.**

GMS Milestone 1:2i

**18**

**Preparation:** Put on a tabletop a selection of 2D polygons (squares, oblongs and triangles) and 3D shapes (spheres, cones and cylinders).

Choose a 2D shape and a 3D shape.

How are they different?

Can you use these words to help you explain?

| edge | corner | curved |
|------|--------|--------|
| flat | straight | round |

**Answers will vary, e.g. one has curved edges; the other has straight sides.**

GMS Milestone 1:2i

**19**

**Preparation:** Provide a collection of real-life 3D objects, e.g. tennis ball (sphere), cardboard tube (cylinder), food or drinks cans (cylinders), cereal boxes (cuboids), gift boxes (cubes and cuboids), pyramid-shaped tea bags, ice cream cones.

Can you find an object that would be good for the bottom of a tower?

Can you tell me why you chose that shape?

**Explanations will vary, but decisions should be linked to the sturdy features of the 3D shape.**

GMS Milestone 1:2j

**20**

**Preparation:** Provide a collection of real-life 3D objects, e.g. tennis ball (sphere), cardboard tube (cylinder), food or drinks cans (cylinders), cereal boxes (cuboids), gift boxes (cubes and cuboids), pyramid-shaped tea bags, ice cream cones.

Can you find an object that would be difficult to use for the bottom of a tower?

Can you explain why?

Are there any other shapes that would be difficult to use?

**Explanations will vary, but decisions should be linked to cone, sphere and pyramid being difficult to balance and stack.**

GMS Milestone 1:2j

**Answers are in bold.**

| 21 | 22 |
|---|---|

**21**

Can you name this 3D shape?



**Pyramid or square-based pyramid**

GMS Milestone 1:2k

**22**

There is a 3D shape in this bag.

It has faces that are either squares or oblongs.

What shape could it be?

**Cuboid**

GMS Milestone 1:2k

**1**

Can you show me all the odd Numicon Shapes?

How do you know that they are odd?

**2**

Can you make some different totals using the Numicon Shapes?

Which totals are even?

**3**

Can you count in fives along this number line?

You can use the 5-shapes to help you.

Can you count backwards in fives too?

**4**

Can you count in twos along this number line?

You can choose a rod to help you.

Can you count backwards in twos too?

**5**

What number is the
brown number rod?

What colour is the
6 number rod?

**6**

What colour is the
6 Numicon Shape?

Can you draw the
Shape pattern?

What number is the purple
Numicon Shape?

**7**

Can you answer these
number sentences?

7 + 2 = ☐

3 + 5 = ☐

10 − 3 = ☐

6 − 4 = ☐

**8**

There are 6 red cars
and 3 blue cars.

How many cars are
there altogether?

There are 8 birds
on a bird table.

5 fly away.

How many birds
are left?

**9**

Ollie has 8 seeds.

Mila has 12 seeds.

How many more seeds does Mila have than Ollie?

NPC Milestone 1:6e

**10**

Choose two number rods from the bag.

Can you use the words and numbers to show the difference between your rods?

| the difference between | | and | | is | |

NPC Milestone 1:6e

**11**

What is the difference between the number of dinosaurs and the number of drums?
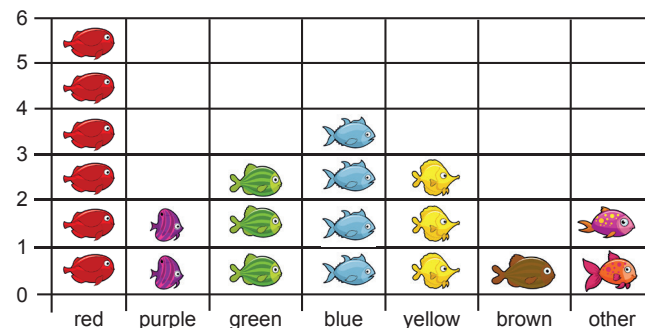
**The number of toys in a shop**



NPC Milestone 1:6f

**12**

# What is the difference between the number of yellow fish and the number of green fish?

## The colour of fish in a tank



NPC Milestone 1:6f

**Answers are in bold.**

**1**

**Preparation:** Provide a set of Numicon Shapes 1–10.

Can you show me all the odd Numicon Shapes?

How do you know that they are odd?

**Explanations will vary. Reference to 'odd piece' or 'not pairs' should be included.**

NPC Milestone 1:6a

**2**

**Preparation:** Provide a set of Numicon Shapes 1–9.

Can you make some different totals using the Numicon Shapes?

Which totals are even?

**Use your professional judgement to determine whether the child is accurate with this question.**

NPC Milestone 1:6a

**3**

**Preparation:** Provide a Numicon 10s Number Line and some 5-shapes.

Can you count in fives along this number line?

You can use the 5-shapes to help you.

Can you count backwards in fives too?

**Accurately count in fives.**

NPC Milestone 1:6b

**4**

**Preparation:** Provide a Numicon 0–100 cm Number Line and some number rods.

Can you count in twos along this number line?

You can choose a rod to help you.

Can you count backwards in twos too?

**Accurately count in twos.**

NPC Milestone 1:6b

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Answers are in bold.

**5**

Preparation: Provide a set of number rods.

What number is the brown number rod? **8**

What colour is the 6 number rod?

**dark green**

1  2  3  4  5  6  7  8  9  10

NPC Milestone 1:6c

**6**
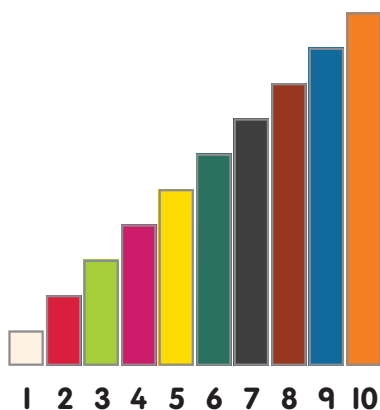
Preparation: Provide a set of Numicon Shapes.

What colour is the 6 Numicon Shape? **Turquoise**

Can you draw the Shape pattern?

What number is the purple Numicon Shape? **9**

1  2  3  4  5  6  7  8  9  10
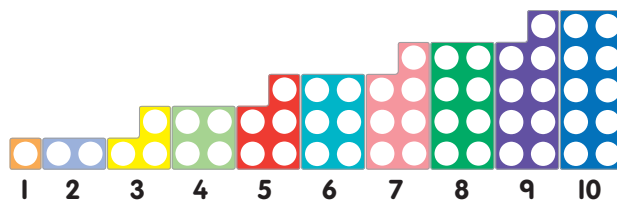
NPC Milestone 1:6c

**7**

Preparation: You may choose to enlarge the questions on separate cards.

Can you answer these number sentences?

$7 + 2 = \square$

$3 + 5 = \square$

$10 - 3 = \square$

$6 - 4 = \square$

**9, 8, 7, 2**

NPC Milestone 1:6d

**8**

Preparation: You may choose to enlarge the questions on separate cards.

There are 6 red cars and 3 blue cars.

How many cars are there altogether? **9**

There are 8 birds on a bird table.

5 fly away.

How many birds are left? **3**

NPC Milestone 1:6d

**Answers are in bold.**

**9**

**Preparation:** Provide a set of Numicon Shapes.

Ollie has 8 seeds.

Mila has 12 seeds.

How many more seeds does Mila have than Ollie?

**Mila has 4 more seeds.**

NPC Milestone 1:6e

**10**

**Preparation:** Put a set of number rods into a Numicon Feely Bag. Provide a set of 'Numeral Cards 1–10', 'Words and Symbols for Calculating' cards and 'Words for Calculating' cards cut from photocopy masters 9, 24a and 24b.

Choose two number rods from the bag.

Can you use the words and numbers to show the difference between your rods?

| the difference between | | and | | is | |

**Answers will vary, e.g.**

| the difference between | 9 | and | 6 | is | 3 |

or

| the difference between | 6 | and | 9 | is | 3 |

NPC Milestone 1:6e

**11**

**Preparation:** If you have a class pictogram you could use that, otherwise use the image below.

What is the difference between the number of dinosaurs and the number of drums?

The number of toys in a shop
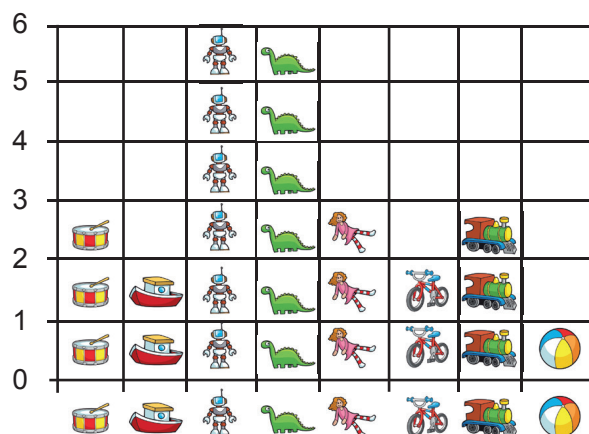


**The difference is 3.**

NPC Milestone 1:6f

**12**

**Preparation:** If you have a class pictogram you could use that, otherwise use the image below.

What is the difference between the number of yellow fish and the number of green fish?

The colour of fish in a tank



**The difference is 0.**

NPC Milestone 1:6f

**1**

Nala is making a poster.

She needs a picture of a fish that is at least 2 cubes long.

Which pictures could she use?

**2**

Leo sorted the number rods.

Can you explain how he sorted them?

**3**

These numbers follow a pattern but one number is missing.

Can you work out the pattern?

Which number is missing?

**4**

I think I have lost some of the number sentences.

Can you check for me?

**5**

Can you read the card for me?

Can you use the Numicon Shapes to make this number?

**6**

Can you read the card for me?

Can you use the rods to make this number?

**7**

Can you write down the number forty-one?

Can you use the rods to make forty-one?

Can you write down the number eighty-nine?

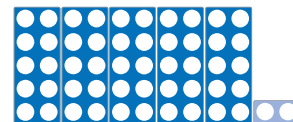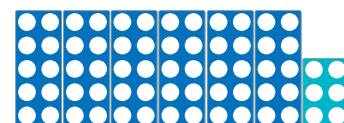Can you use the rods to make eighty-nine?

**8**

Can you write down the number fifty-two?

Can you use the Numicon Shapes to make fifty-two?

Can you write down the number sixty-six?

Can you use the Numicon Shapes to make sixty-six?

**9**

Can you tell me how to solve these calculations?

$5 + 4 + 4 = \boxed{\phantom{0}}$

$6 + 6 + 2 = \boxed{\phantom{0}}$

$3 + 6 + 3 = \boxed{\phantom{0}}$

NPC Milestone 1:7e

**10**

Can you tell me how to solve these calculations?

$5 + 8 + 5 = \boxed{\phantom{0}}$

$6 + 7 + 3 = \boxed{\phantom{0}}$

$4 + 6 + 9 = \boxed{\phantom{0}}$

NPC Milestone 1:7e

**11**

Choose three numbers to add together.

$\boxed{\phantom{0}} + \boxed{\phantom{0}} + \boxed{\phantom{0}} = \boxed{\phantom{0}}$

Which order would you add them in?

Can you explain why?

NPC Milestone 1:7f

**12**

Can you explain how to solve this calculation?

Which did you find the easiest?

Why?
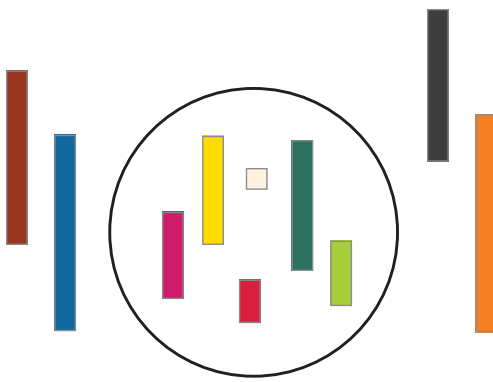
What do you notice about these three calculations?

NPC Milestone 1:7f

**Answers are in bold.**

---

**1**

**Preparation:** Cut out the fish images from photocopy master 5, 'Fish Problem Solving'. Provide some interlocking cubes.

Nala is making a poster.

She needs a picture of a fish that is at least 2 cubes long.

Which pictures could she use?

**There are six fish that measure more than 2 cubes.**

NPC Milestone 1:7a

---

**2**

**Preparation:** Set up a sorting hoop and number rods, as shown below.

Leo sorted the number rods.

Can you explain how he sorted them?



**Answers may vary, e.g. maximum 6, less than 7.**

NPC Milestone 1:7a

---

**3**

**Preparation:** Cut out numbers 10–20 from photocopy master 10, 'Numeral Cards 0–20'. Remove number 15 and place the other numbers randomly on a tabletop.

These numbers follow a pattern but one number is missing.

Can you work out the pattern?

Which number is missing?

**Children should set the cards out systematically from 10 to 20 and identify the gap in the pattern (15).**

NPC Milestone 1:7b

---

**4**

**Preparation:** Cut out the cards from photocopy master 2, 'Adding and Subtracting to 10 Cards'. Remove '1 + 3 = ' and '1 + 7 = ' and place the other cards on a tabletop.

I think I have lost some of the number sentences.

Can you check for me?

**Children should set out the sentences systematically and identify the gaps in the pattern (1 + 3 and 1 + 7).**

NPC Milestone 1:7b

---

**Answers are in bold.**

---

**5**

**Preparation:** Provide some sets of Numicon Shapes and Numeral Cards 21, 25, 28. Present the cards one at a time.

Can you read the card for me?

Can you use the Numicon Shapes to make this number?

**21**   **25**   **28**

NPC Milestone 1:7c

---

**6**
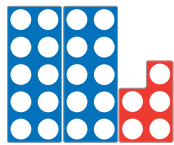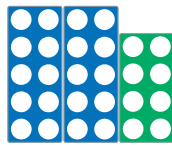
Preparation: Provide some sets of number rods and Numeral Cards 24, 26, 30. Present the cards one at a time.

Can you read the card for me?

Can you use the rods to make this number?

**24**   **26**   **30**

NPC Milestone 1:7c

---

**7**

**Preparation:** Provide number rods.

Can you write down the number forty-one?

Can you use the rods to make forty-one?

Can you write down the number eighty-nine?

Can you use the rods to make eighty-nine?

**Answers**

**41**   **89**

NPC Milestone 1:7d

---

**8**
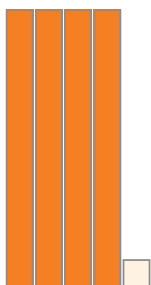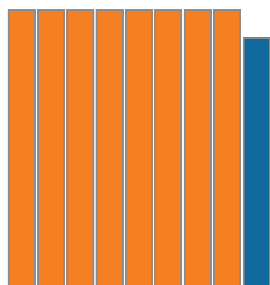
**Preparation:** Provide Numicon Shapes.

Can you write down the number fifty-two?

Can you use the Numicon Shapes to make fifty-two?

Can you write down the number sixty-six?

Can you use the Numicon Shapes to make sixty-six?

**Answers**

**52**

**66**

NPC Milestone 1:7d

---

**Answers are in bold.**

**9**

Can you tell me how to solve these calculations?

$5 + 4 + 4 =$ ☐

$6 + 6 + 2 =$ ☐

$3 + 6 + 3 =$ ☐

**13, 14, 12. Use your professional judgement to determine whether the child chooses an efficient strategy.**

NPC Milestone 1:7e

**10**

Can you tell me how to solve these calculations?

$5 + 8 + 5 =$ ☐

$6 + 7 + 3 =$ ☐

$4 + 6 + 9 =$ ☐

**18, 16, 19. Explanations may vary. Children should link to finding pairs that make 10, e.g. I know 5 + 5 makes 10, then I added 8 to make 18. Use your professional judgement to consider whether other strategies are efficient.**

NPC Milestone 1:7e

**1.7** **Numicon Milestone Assessment – NPC 1 Milestone 7 (Teacher)**

**Answers are in bold.**

**11**

**Preparation:** Cut out numbers 1–9 from photocopy master 9, 'Numeral Cards 0–10' and one adding frame from photocopy master 1, 'Adding Frame'.

## Choose three numbers to add together.

☐ + ☐ + ☐ = ☐

## Which order would you add them in?

Children can be encouraged to use the adding frame to show the order.

## Can you explain why?

Ask the child to repeat this, choosing another three numbers at random.

**Use your professional judgement to note whether the child decides to reorder the digits if appropriate.**

NPC Milestone 1:7f

**12**

**Preparation:** Write the questions below on the 'Adding Frame' (photocopy master 1). Cut out each question and present them individually.

## Can you explain how to solve this calculation?

5 + 1 + 9 = ☐

9 + 5 + 1 = ☐

1 + 9 + 5 = ☐

## Which did you find the easiest?

## Why?

## What do you notice about these three calculations?

**Use your professional judgement to determine whether the child recognizes that numbers can be added in any order, and that some orders are easier than others.**

NPC Milestone 1:7f

**1**

How many different-patterned squares can you make out of 4 pegs?

You can use any of the yellow or blue pegs.

**2**

How many ways can you make 5?

Use the rods to help you.

Can you write down the number sentences?

**3**

Ali says, "If I add 2 to any odd number it will make a new odd number."

Do you think Ali is right?

Can you use Numicon Shapes to explain why or why not?

**4**

Pick a Numicon Shape that is less than 10.

Add 10.

What number have you made?

Add another 10.

What number have you made?

Can you tell me about any patterns you find?

**5**

Which two Numicon Shapes will balance with 10 + 6?

Can you find more than one answer?

**6**

There are three different Numicon Shapes in a bag.

The Shapes make 9 when they are added together.

What Shapes could they be?

Do you think there could be more than one answer?

**7**

Choose a card and read out the number.

Can you use Numicon Shapes to show your number as tens and ones?

Can you make it another way?

**8**

This parts and wholes model shows 42 as tens and ones.

**42**

Can you use rods and the model to show me 42 in a different way?

**9**

Stickers come in sheets of 10.

I have 2 full sheets and 6 more stickers.

How many stickers do I have altogether?

Can you show me using the Numicon Shapes?

NPC Milestone 1:8e

**10**

Jasmin is collecting 1p coins.

She has 19 and her mum gives her 10 more.

How many 1p coins does Jasmin have now?

NPC Milestone 1:8e

**11**

Choose three cards.

How can you add these numbers together?

Can you explain the best way to do it?

NPC Milestone 1:8f

**12**

Spin each spinner.

Can you add the two numbers together easily?

Choose one of the spinners to spin again to get a third number.

What would be a good new number to spin?

Why?

NPC Milestone 1:8f

**13**

Can you tell me two numbers that make 10 when you add them together?

Now can you use this fact to find two numbers that make 12?

NPC Milestone 1:8g

**14**

$$6 + 4 = 10$$
$$6 + \boxed{\phantom{0}} = 11$$

How can the top number sentence help you to find the missing number?

You can use the Numicon Shapes to help you.

Can you explain your thinking?

NPC Milestone 1:8g

**Answers are in bold.**

## 1

**Preparation:** Provide a Numicon Baseboard and more than enough blue and yellow Numicon Pegs to make all possible patterns.

How many different-patterned squares can you make out of 4 pegs?

You can use any of the yellow or blue pegs.
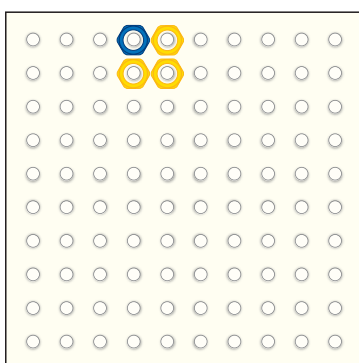
**Five without rotations.**

## 2
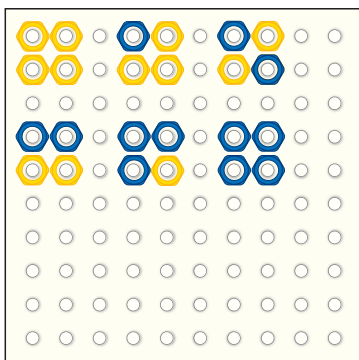
**Preparation:** Provide some number rods.

How many ways can you make 5?

Use the rods to help you.

Can you write down the number sentences?

**Approaches will vary, but look for children who work systematically.**

**1 + 4 = 5**

**4 + 1 = 5**

**2 + 3 = 5**

**3 + 2 = 5**

**5 + 0 = 5**

**0 + 5 = 5**

NPC Milestone 1:8a

NPC Milestone 1:8a

**Answers are in bold.**

| 3 | 4 |
|---|---|
| **Preparation:** Provide a set of Numicon Shapes. | **Preparation:** Provide a set of Numicon Shapes and some extra 10-shapes. |

**3**

**Preparation:** Provide a set of Numicon Shapes.

Ali says, "If I add 2 to any odd number it will make a new odd number."

Do you think Ali is right?

Can you use Numicon Shapes to explain why or why not?

**Explanations will vary, e.g.
Ali is correct, as 2 more than any odd
Numicon Shape will be odd.**

**4**

**Preparation:** Provide a set of Numicon Shapes and some extra 10-shapes.

Pick a Numicon Shape that is less than 10.

Add 10.

What number have you made?

Add another 10.

What number have you made?

Can you tell me about any patterns you find?

If children do not see a pattern yet encourage them to keep adding 10.

**Explanations will vary, e.g.
every time I add 10 the ones Shape
stays the same.**

NPC Milestone 1:8b

NPC Milestone 1:8b

**Answers are in bold.**

| 5 | 6 |
|---|---|

**Preparation:** Provide a Numicon Pan Balance and at least two sets of Numicon Shapes.

## Which two Numicon Shapes will balance with 10 + 6?

## Can you find more than one answer?
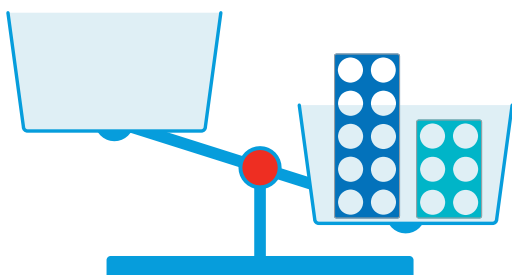


**Answers will vary, but children should recognize that there is more than one possible answer, e.g. 8 + 8, 9 + 7, 10 + 6.**
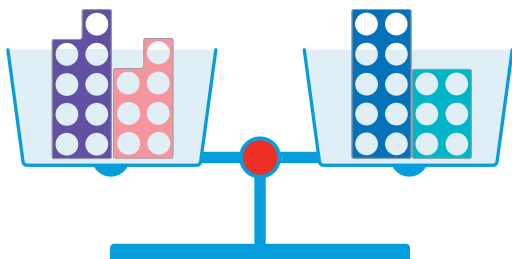


**Preparation:** Provide a Numicon Feely Bag and Numicon Shapes so that children can explore different possible answers with these if needed.

## There are three different Numicon Shapes in a bag.

## The Shapes make 9 when they are added together.

## What Shapes could they be?

## Do you think there could be more than one answer?

**1 + 2 + 6**

**1 + 3 + 5**

**2 + 3 + 4**

| NPC Milestone 1:8c | NPC Milestone 1:8c |
|---|---|

**Answers are in bold.**

| 7 | 8 |
|---|---|

**7**

Choose a card and read out the number.

Can you use Numicon Shapes to show your number as tens and ones?

Can you make it another way?

**Answers will vary, e.g. for 36**



**8**

This parts and wholes model shows 42 as tens and ones.
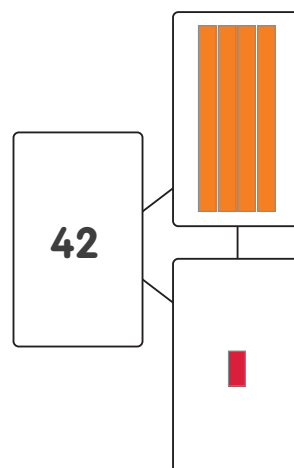


Can you use rods and the model to show me 42 in a different way?

**Answers will vary, e.g.**
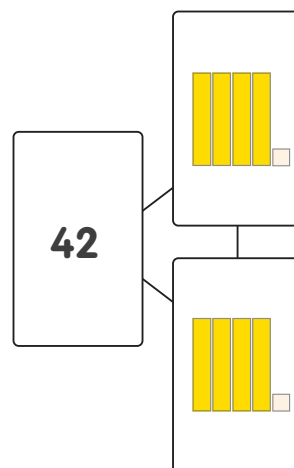


NPC Milestone 1:8d

NPC Milestone 1:8d

**Answers are in bold.**

| 9 | 10 |
|---|---|
| **Preparation:** Provide two sets of Numicon Shapes. | **Preparation:** Provide two sets of Numicon Shapes. |

**9**

Stickers come in sheets of 10.

I have 2 full sheets and 6 more stickers.

How many stickers do I have altogether?

Can you show me using the Numicon Shapes?

**26**
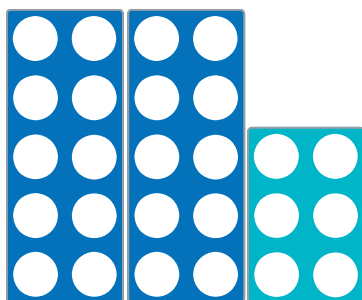
**10**

Jasmin is collecting 1p coins.

She has 19 and her mum gives her 10 more.

How many 1p coins does Jasmin have now?

**29**

NPC Milestone 1:8e

NPC Milestone 1:8e

# 1.8 Numicon Milestone Assessment – NPC 1 Milestone 8 (Teacher)

**Answers are in bold.**

## 11

**Preparation:** Cut out a set of 'Numeral Cards 1–10' from photocopy master 9.

Choose three cards.

How can you add these numbers together?

Can you explain the best way to do it?

**Use your professional judgement to determine whether the child is accurate with this question. Look for those children who reorder or who make number bond pairs.**

NPC Milestone 1:8f

## 12

**Preparation:** Cut out the numeral 1–5 and 6–10 overlays from the 'Spinner Overlays' (photocopy master 20) and provide a set of Numicon Shapes.

Spin each spinner.

Can you add the two numbers together easily?

Choose one of the spinners to spin again to get a third number.

What would be a good new number to spin?

Why?

**Explanations will vary. If the child initially spins a 2 and a 7 then a good third spin might be 8, 3 or 1: pairs to 10 or total to 10.**

NPC Milestone 1:8f

**Answers are in bold.**

| 13 | 14 |
|---|---|
| Can you tell me two numbers that make 10 when you add them together? | **Preparation:** Provide some Numicon Shapes. |

**13**

Can you tell me two numbers that make 10 when you add them together?

Now can you use this fact to find two numbers that make 12?

**A pair of numbers that total 10 and then an adjustment of 2, either as 1 to each number or 2 to one number.**

**14**

**Preparation:** Provide some Numicon Shapes.

$$6 + 4 = 10$$
$$6 + \boxed{\phantom{0}} = 11$$

How can the top number sentence help you to find the missing number?

You can use the Numicon Shapes to help you.

Can you explain your thinking?

**An answer that covers 11 being 1 more than 10, therefore 6 + 5 = 11 as 5 is 1 more than 4.**
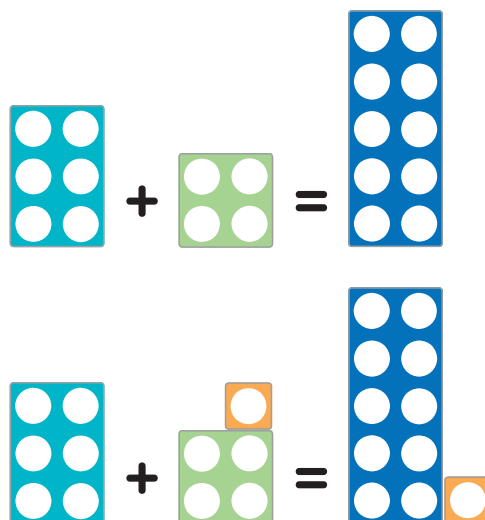
NPC Milestone 1:8g

NPC Milestone 1:8g

**1**

Can you find all of the cuboids in the bag?

How do you know they are cuboids?
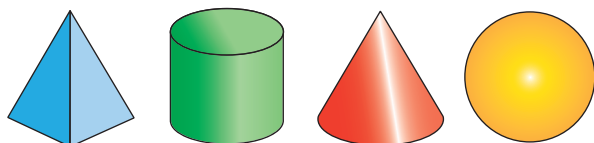
GMS Milestone 1:3a

**2**

Can you sort these shapes into cubes and cuboids?

How did you decide which shapes to put in each group?

GMS Milestone 1:3a

**3**

Can you tell me the names of these shapes?



GMS Milestone 1:3b

**4**

Look at my shape labels.

Are the shapes labelled correctly?

Can you put them right?

GMS Milestone 1:3b

**5**

Can you put these shapes into two groups?

Can you label your two groups?

GMS Milestone 1:3c

**6**

Can you put these shapes into two groups?

Can you label your two groups?

GMS Milestone 1:3c

**7**

Can you put these labels in order?

Can you explain how you did this?

GMS Milestone 1:3d

**8**

Can you start at 12 o'clock (midday) and put the labels in time order?

Now can you add the night and day labels?

GMS Milestone 1:3d

**9**

What can you tell me about this hand on the clock?

GMS Milestone 1:3e

**10**

What can you tell me about this hand on the clock?

How is it different from the other hand?

GMS Milestone 1:3e

**11**

Can you use the clock to show these times?

**midnight**     **half past 2**

**half past 7**     **9 o'clock**

GMS Milestone 1:3f

**12**

Can you draw hands on the clocks to show these times?

**midday**     **6 o'clock**

**half past 8**     **half past 1**

GMS Milestone 1:3f

**13**
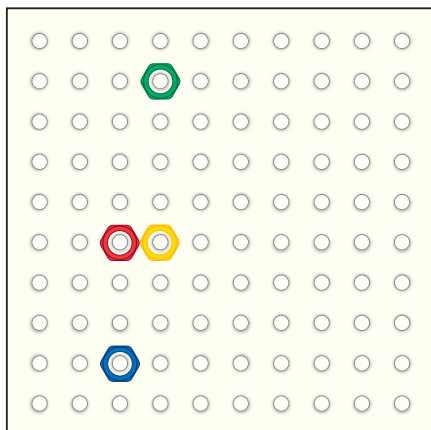


Can you describe the positions of the pegs?

**14**

Can you follow these instructions?

Put the red cube to the left of the blue cube.

Put the white cube to the right of the blue cube.

Put the yellow cube behind the blue cube.

Put the pink cube below the white cube.

**15**

Can you follow these instructions?

Move the car forward and then make a quarter turn clockwise.

Continue forwards, then make a half turn anti-clockwise

Now make a full turn.

**16**

Can you follow these instructions?

Make a three-quarter turn anti-clockwise.

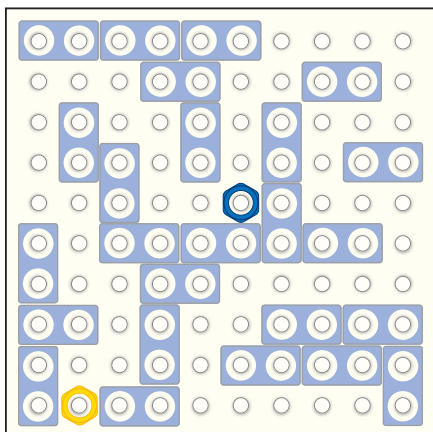Then make a half turn clockwise.

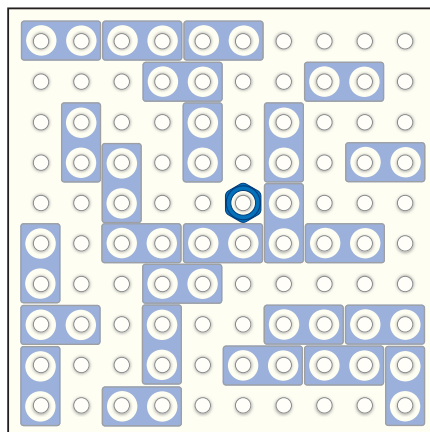Now make a quarter turn clockwise.

**17**



Can you give directions to move the yellow peg to the blue peg?

GMS Milestone 1:3i

**18**



Can you follow the instructions and put a red peg on your final position?

Start on the blue peg.

Go up 3. Go right 1.

Go up 1. Go right 3.

Go down 2. Go left 2.
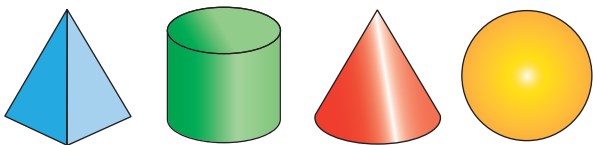
Go down 2. Go right 2.

Go down 2. Go left 4.

Go down 1. Go left 1.

Go down 2.

GMS Milestone 1:3i

**Answers are in bold.**

**1**

**Preparation:** Put some different-sized cubes and different-sized and shaped cuboids into a Numicon Feely Bag.

Can you find all of the cuboids in the bag?

How do you know they are cuboids?

**Explanations will vary, but should include reference to oblongs.**

GMS Milestone 1:3a

**2**

**Preparation:** Put on a tabletop some different-sized cubes and different-sized and shaped cuboids. Provide labels for 'cubes' and 'cuboids'.

Can you sort these shapes into cubes and cuboids?

How did you decide which shapes to put in each group?

**Explanations will vary, but should include reference to geometrical properties and cubes and cuboids.**

GMS Milestone 1:3a

**3**

**Preparation:** Provide a selection of spheres, cylinders, cones and various pyramids, including a tetrahedron.

Can you tell me the names of these shapes?

**Children might match the pictures to the physical shapes. They should identify the physical shapes as pyramids (including the tetrahedron), cylinders, cones and spheres.**

GMS Milestone 1:3b

**4**

**Preparation:** Provide a selection of spheres, cylinders, cones and various pyramids. Also provide labels for each shape but label each shape incorrectly.

Look at my shape labels.

Are the shapes labelled correctly?

Can you put them right?

**Labels are adjusted to label the shapes correctly.**

GMS Milestone 1:3b

**Geometry, Measurement and Statistics 1**

**Answers are in bold.**

---

**5**

**Preparation:** Provide blank labels and a selection of different-sized 2D shapes: circles, triangles, oblongs and squares.

Can you put these shapes into two groups?

Can you label your two groups?

**Use your professional judgement to determine whether the child has chosen an appropriate way to group the shapes and has grouped all the shapes correctly, e.g. curved sides, straight sides.**

GMS Milestone 1:3c

---

**6**

**Preparation:** Provide blank labels and a selection of 3D shapes: cube, cuboid, pyramid, sphere, cylinder and cone.

Can you put these shapes into two groups?

Can you label your two groups?

**Use your professional judgement to determine whether the child has chosen an appropriate way to group the shapes and has grouped all the shapes correctly, e.g. curved faces, straight faces.**

GMS Milestone 1:3c

---

**7**

**Preparation:** Cut out 'midnight', 'morning', 'afternoon' and 'midday' from photocopy master 22, 'Time Cards'. Lay them out in a random order.

Can you put these labels in order?

Can you explain how you did this?

**Children should put these labels into time order, e.g. morning, midday, afternoon, midnight.**

GMS Milestone 1:3d

---

**8**

**Preparation:** Cut out the 'O'clock Cards' from photocopy master 11, and 'day' and 'night' cards from the photocopy master 23, 'Time Labels'.

Can you start at 12 o'clock (midday) and put the labels in time order?

Now can you add the night and day labels?

**12 o'clock (p.m.) through to 11 o'clock (a.m.)**

**Accept any reasonable position for the 'day' and 'night' cards.**
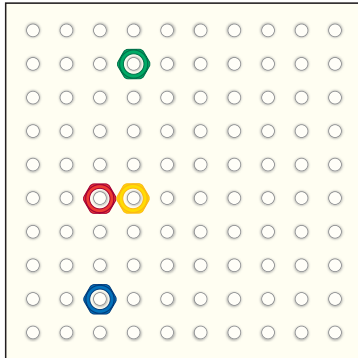
GMS Milestone 1:3d

---

Answers are in bold.

| 9 | |
|---|---|

**Preparation:** Have ready a geared clock.

Point to the minute hand.

What can you tell me about this hand on the clock?

**Explanations will vary, e.g. it's the long hand, it points to the minutes, it moves more quickly than the other hand.**

GMS Milestone 1:3e

---

| 10 | |
|---|---|

**Preparation:** Have ready a geared clock.

Point to the hour hand.

What can you tell me about this hand on the clock?

How is it different from the other hand?

**Explanations will vary, e.g. it's the short hand, it points to the hours, it moves very slowly compared with the other hand.**

GMS Milestone 1:3e

---

| 11 | |
|---|---|

**Preparation:** Provide a geared clock.

Can you use the clock to show these times?

| midnight | half past 2 |
|----------|-------------|
| half past 7 | 9 o'clock |

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:3f

---

| 12 | |
|---|---|

**Preparation:** Provide photocopy master 3, 'Clock Faces'.

Can you draw hands on the clocks to show these times?

| midday | 6 o'clock |
|--------|-----------|
| half past 8 | half past 1 |

**Use your professional judgement to determine whether the child is accurate with this question.**

GMS Milestone 1:3f

---

**Geometry, Measurement and Statistics 1**

Answers are in bold.

---

**13**

**Preparation:** Prepare a Numicon Baseboard with four Numicon Pegs in different colours placed as shown.



Can you describe the positions of the pegs?

**Answers will vary, e.g. the green peg is above the yellow peg; the blue peg is below the red peg; yellow is next to red; red is on the left of yellow, etc.**

GMS Milestone 1:3g

---

**14**

**Preparation:** Provide some interlocking cubes of different colours, e.g. yellow, red, white, blue, green.

Can you follow these instructions?

Put the red cube to the left of the blue cube.

Put the white cube to the right of the blue cube.

Put the yellow cube behind the blue cube.

Put the pink cube below the white cube.

**Check that the model matches your instructions.**

GMS Milestone 1:3g

---

**15**

**Preparation:** Give the child a toy car.

Can you follow these instructions?

Move the car forward and then make a quarter turn clockwise.

Continue forwards, then make a half turn anti-clockwise

Now make a full turn.

**Children follow the instructions accurately.**

GMS Milestone 1:3h

---

**16**

**Preparation:** The child should start facing you.

Can you follow these instructions?

Make a three-quarter turn anti-clockwise.

Then make a half turn clockwise.

Now make a quarter turn clockwise.

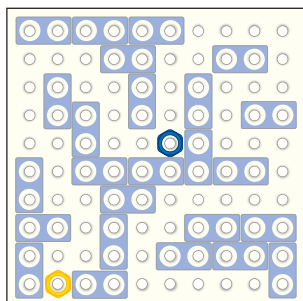**Children follow the instructions accurately.**

GMS Milestone 1:3h

---

**Geometry, Measurement and Statistics 1**

**Answers are in bold.**

| | |
|---|---|
| **17** | **18** |

**17**

**Preparation:** Set up a Numicon Baseboard with 25 Numicon 2-shapes and two Numicon Pegs, as shown.
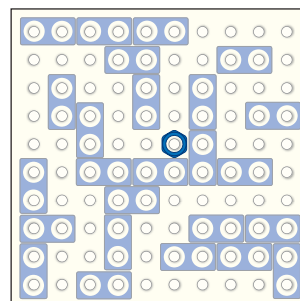


Can you give directions to move the yellow peg to the blue peg?

**Up 1, right 1, up 2, left 1, up 2, left 1, up 3, right 2, down 1, right 1, down 2, right 2.**

**18**

**Preparation:** Set up a Numicon Baseboard with 25 Numicon 2-shapes and a Numicon Peg, as shown. Provide one red Numicon Peg.



Can you follow the instructions and put a red peg on your final position?

Start on the blue peg.

Go up 3. Go right 1.

Go up 1. Go right 3.

Go down 2. Go left 2.

Go down 2. Go right 2.

Go down 2. Go left 4.

Go down 1. Go left 1.

Go down 2.

**Answer**



GMS Milestone 1:3i

GMS Milestone 1:3i