

# NPC 4 – Getting Started

## Organisational Planning and Assessment

1. Look at the year's over view of NPC and GMS
  2. Go to the Long Term Planning in NPC or GMS
  3. Go to Medium Term Planning to see where your desired concept fits along with the Milestones to make sure you have provided the foundations in sequence for this concept
  4. Look through the Individual Pupil Assessment Record- Milestone grids at the beginning of Photocopy Masters in the Teaching Resource Handbook
  5. Go to the activity group- first page for planning and overview
  6. Look at Explore More for homework or extra classroom activities
  7. Look at the Explorer Progress Books for Student Assessments
  8. Get ready all the apparatus, resources and photocopy masters
  9. Enjoy the exciting learning activities planned and incorporate any of your own using your teacher judgment!

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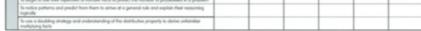
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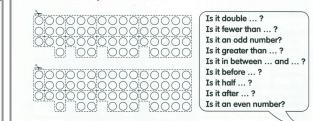
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### **Numicon Shape Pattern Hunt**



**Educational context**

This activity group is to help children and teachers become familiar with structured apparatus including Numicon Shapes, number rods and base-ten apparatus, and to notice and describe the attributes of Numicon Shapes and number rods and use these to sort both Shapes and rods in different ways.

Refer to Numicon Shapes and number rods by number name, order them and describe relationships between them.

- Pencils

**During the activity, look at what your child can do**

- Recognize the Numicon Shape patterns and place them on one of their grids. They can be placed any way round. Do the same on one of your grids. ☺
- Ask your child to name a square where they think a Numicon Shape pattern might be hidden on



Ask children to identify the patterns and structures they see and name their symbols.

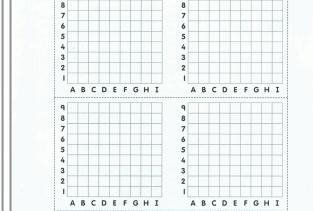
Ask for the four calculating symbols we use.

Introduce in this activity group. The activities provide opportunities for children to practise calculating with situations appropriate for themselves, and will give them opportunities to practise their mathematical language. This will help them to understand which words may affect how teachers decide to group children. If children are not accustomed to working on open-ended problems, they will need encouragement to experiment, especially when they will need encouragement to predict.

- ▶ Encourage and use the language for adding, subtracting, multiplying and dividing the symbols  $=$ ,  $-$ ,  $\times$ ,  $\div$ ,  $<$  and  $>$ .
- ▶ Use structured approaches to strengthen their thinking skills. For example, in enclosed apparatus using mathematical language.
- ▶ Use the concrete methods of adding and subtracting numbers, multiplying and dividing by one number with numbers on number lines.

If children have ongoing difficulties, they are likely to need extra support and encouragement.

- Discuss how the Numicon Shape patterns relate to each other.



# Numicon teaching progression: Number, Pattern and Calculating 4 and Geometry, Measurement and Statistics 4

The Numicon teaching progression chart gives an overview of the expected coverage over the school year and the recommended order for teaching the activity groups. (Statistics work has been included within the Geometry and Measurement activity groups through appropriate contexts.)

See the long- and medium-term planning documents for Number, Pattern and Calculating 4 and Geometry, Measurement and Statistics 4 for references to assessment milestone statements; a fantastic tool for measuring children's progress.

Strand and activity group number	Activity group title
<b>Getting Started</b>	Getting started with Number, Pattern and Calculating 4
<b>Calculating</b> 1	Using adding and subtracting facts and understanding inverse relationships
<b>Numbers and the Number System</b> 1	Understanding place value in 4-digit numbers
<b>Pattern and Algebra</b> 1	Exploring sequences and number patterns
<b>Numbers and the Number System</b> 2	Ordering and comparing numbers to 1000 and beyond
<b>Calculating</b> 2	Strategies for bridging when adding and subtracting
<b>Numbers and the Number System</b> 3	Estimating and rounding
<b>Geometry</b> 1	Classifying triangles and quadrilaterals
<b>Calculating</b> 3	Developing fluency with mental adding strategies
<b>Calculating</b> 4	Developing fluency with mental subtracting strategies
<b>Calculating</b> 5	Developing fluency with multiplying facts to $12 \times 12$
<b>Calculating</b> 6	Developing fluency with dividing facts to $12 \times 12$
<b>Pattern and Algebra</b> 2	Exploring inverse relationships
<b>Calculating</b> 7	Mental strategies for multiplying and dividing by 10 and 100
<b>Geometry</b> 2	Understanding reflective symmetry
<b>Numbers and the Number System</b> 4	Introducing negative numbers
<b>Numbers and the Number System</b> 5	Fractions and recognizing part-whole relationships
<b>Calculating</b> 8	Developing fluency with the column method of adding
<b>Calculating</b> 9	Developing fluency with the column method of subtracting
<b>Geometry</b> 3	Investigating angles in shapes
<b>Numbers and the Number System</b> 6	Introducing decimal fractions

<b>Strand and activity group number</b>	<b>Activity group title</b>
<b>Pattern and Algebra</b> <b>3</b>	Exploring ‘equals’ in balancing number sentences
<b>Calculating</b> <b>10</b>	Exploring the distributive property and developing written methods of multiplying
<b>Calculating</b> <b>11</b>	Using multiplying facts to solve dividing problems
<b>Pattern and Algebra</b> <b>4</b>	Exploring multiples and factors
<b>Calculating</b> <b>12</b>	Developing fluency with the short written method of multiplying
<b>Calculating</b> <b>13</b>	Developing fluency with the short written method of dividing
<b>Calculating</b> <b>14</b>	Solving problems involving more than one step
<b>Measurement</b> <b>1</b>	Finding times and durations, and using 24-hour clock
<b>Pattern and Algebra</b> <b>5</b>	Looking for growing patterns in problem solving
<b>Geometry</b> <b>4</b>	Reading and plotting positions using coordinates
<b>Numbers and the Number System</b> <b>7</b>	Exploring equivalence in fractions and introducing proportion
<b>Numbers and the Number System</b> <b>8</b>	Introducing decimal fractions with two places
<b>Measurement</b> <b>2</b>	Calculating with money amounts
<b>Measurement</b> <b>3</b>	Understanding and using units of length and distance
<b>Measurement</b> <b>4</b>	Understanding and using units of mass
<b>Measurement</b> <b>5</b>	Understanding and using units of capacity and volume
<b>Pattern and Algebra</b> <b>6</b>	Solving problems and puzzles systematically
<b>Measurement</b> <b>6</b>	Understanding perimeter and area
<b>Pattern and Algebra</b> <b>7</b>	Exploring general rules, reasoning and logic

# Getting Started: Getting started with Number, Pattern and Calculating 4

## Key mathematical ideas

Pattern, Adding, Subtracting, Multiplying, Dividing, Place value, Mathematical thinking and reasoning

### Educational context

This activity group is to help children and teachers become familiar with structured apparatus including Numicon Shapes, number rods and base-ten apparatus, and to help them make connections between the patterns and structure they see and their number ideas. Actions for the four calculating symbols are also introduced in this activity group. The activities provide essential opportunities for children to connect meanings with structured apparatus for themselves, and will give teachers valuable insights into children's mathematical understanding. This will help with initial assessing, which in turn may affect how teachers decide to group children. If children are not accustomed to working on openended activities some of their initial responses may be superficial, consequently they will need encouragement to persevere until they develop confidence to find things out for themselves.

Depending on children's previous experiences, allow two or three days for these activities before moving on to Calculating 1, Numbers and the Number System 1 and Pattern and Algebra 1.

### Learning opportunities

- To connect Numicon Shapes with number ideas.
- To connect number rods with number ideas.
- To connect structured apparatus with numerals, number words and positions on a number line.
- To see and explain patterns in number relationships illustrated with structured apparatus.
- To describe number relationships using mathematical language.
- To revise the mathematical language for calculating operations.
- To revise actions representing the symbols of arithmetic notation:  $+$ ,  $-$ ,  $=$ ,  $\times$ ,  $\div$ .
- To revise use of 'is less/fewer than' and 'is greater/more than' symbols ( $<$  and  $>$ ) respectively.
- To revise using the column methods of adding and subtracting and the short written methods of multiplying and dividing.

### Words and terms for use in conversation

number names to 100 and beyond, pattern, next, before, after, in between, ordinal number names (e.g. first, second, third), terms for comparing (e.g. small, smaller than, smallest, long, longer than, longest, few, fewer than, fewest, more than, less than, greater than), set, add, altogether, total, more, take away, subtract, difference, decrease, 'how many more to reach ...?', multiply, times, divide, share between, equal, visualize, column method, short written method

### Assessment opportunities

Look and listen for children who can:

- Use the words and terms for use in conversation effectively.
- Notice and describe the attributes of Numicon Shapes and number rods and use these to sort both Shapes and rods in different ways.
- Refer to Numicon Shapes and number rods by number name, order them and describe relationships between them.
- Connect Numicon Shapes, number rods, numerals and number names with positions on a number line.
- Recognize and use the language for adding, subtracting, multiplying and dividing and the symbols  $+$ ,  $-$ ,  $\times$ ,  $\div$ ,  $<$  and  $>$ .

### Learning opportunities

- Use structured apparatus to illustrate their thinking.
  - Describe relationships they see in structured apparatus using mathematical language.
  - Use the column methods of adding and subtracting and the short written methods of multiplying and dividing effectively.
- If children have ongoing difficulties they are likely to need additional and differentiated support. Refer back to the Number Pattern and Calculating 2 and 3 Teaching Resource Handbooks for activities to establish children's understanding of earlier ideas. If any children are experiencing more fundamental difficulties, consider running the Numicon Intervention Programme for them.

### Explorer Progress Book 4a, 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: Numicon Shape Pattern Hunt

After completing work on Activity 4, give children Explore More Copymaster 1: Numicon Shape Pattern Hunt (enlarged to A3) to take home.

### Focus activities

- What maths can you show with Numicon Shapes?
- What maths can you show with number rods?
- Knowing the Numicon Shape patterns
- Describing relationships between Numicon Shapes or number rods
- Cover the board with Numicon Shapes
- Supporting calculating with Numicon Shapes or number rods
- What maths can you show with base-ten apparatus?

## **Individual Pupil Assessment Record – Milestones**

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Milestone 1		Group:	
		Name:	Name:
By this point, children should be able to:			
To give a sensible estimate of amounts of more than 100 objects			
To count aloud across multiples of 100 and multiples of 1000 to 10000			
To read, write and build 4-digit numbers with apparatus and say the value of each digit			
To order and compare numbers to 1000			
To recognize and count forwards and backwards in sequences of multiples of all numbers to 12			
To notice patterns in sequences of multiples, explain the rule for the sequence and use this to find missing numbers			
To use the idea of constant difference to find missing numbers in sequences			
To know and use patterns in adding and subtracting facts for any multiple of 10			
To have fluent recall of adding and subtracting facts to 10 to derive adding and subtracting facts to 100			
To recall adding and subtracting facts to add and subtract single digit numbers to/from any number to 1000			
To use the inverse relationship between adding and subtracting to check totals are correct			
To give a rounded estimate of amounts to 1000			
To round any number to the nearest 10, 100 or 1000			
To connect estimation and rounding numbers to the use of measuring instruments			
To use the strategy of rounding numbers and adjusting to make calculations easier			
To use the strategy of partitioning in different ways to simplify adding and subtracting calculations			
To use the strategy of adding or subtracting multiples of 10 in mental calculating			
To use compensating as a non-computational strategy for adding and subtracting			
To know that it is important to look carefully at the numbers involved in a calculation before deciding which strategy to use			
To recall multiplying and dividing facts for multiplication tables up to $12 \times 12$			
To generalize and explain the effects of multiplying by 0 and by 1			
To use the commutative property of multiplying and the inverse relationship between dividing and multiplying to speed up fluent recall of multiplying and dividing facts			

# Preparation and check lists

## **Day 1 – Focus Teaching Activity 1 - Have ready:**

- 0-100 Numicon number line
- Numicon shapes (empty them out of the boxes into a large plastic container)
- Extra 10- shapes
- Numicon Display Number Line
- Numicon Baseboard Laminates
- Numicon software-optional
- Whiteboard marker pens
- Numeral cards 0-100 for independent activity

## **Day 1 – Activity 2 - Have ready:**

- Cuisenaire rods
- Numicon software-optional
- Metre rulers or students' rulers or Numicon 0-100 number line, or Numicon number track
- Numeral cards 0-100 for independent activity

## **Day 2 – Activity 3 - Have ready:**

- Individual Numicon shapes hidden in Feely Bags
- Counters or Numicon pegs
- Other objects for counting
- Numeral cards 0-100 for independent activity

## **Day 2 – Activity 4 - Have ready:**

- Numicon shapes
- Cuisenaire rods
- Feely Bags
- Numicon software – optional
- Flash cards of < and >
- Explore More Copymaster 1 – Number Shape Pattern Hunt

## **Day 3 – Activity 5 - Have ready:**

- 2 sets of Numicon shapes 1-10 per pair of students to work together on this task
- Baseboard laminates – grey side or plastic ones, 1 per pair

## **Day 3 – Activity 6 – Have ready:**

- Numicon shapes
- 0-100 number line
- Cuisenaire rods
- Number tracks
- Metre rulers
- Number sentences pre-written – see on page 8 of this document
- Subtracting covers – students can cut their own from Photocopy Master (PCM) 45
- Tens and ones frame – see on Page 4 of this document – optional

## **Day 4 – Activity 7 – Have ready:**

- Base Ten (Place value) apparatus
- Photocopy Master 35 enlarged to A3. Download the 'ones' version from the website. Supporting resources
- 100 -200 section of the 1-1001 number line
- Explore Progress books – pages 2 and 3 for each student to complete in their independent activities

***Please note: Take two weeks if necessary- don't be rushed through these foundational activities***

**Independent Activities Summary:**

- Individual work for most of the activities are repeats or extensions of what the students have done in the Focus Teaching Activities
- The apparatus is the same as the activity groups, except for needing more sets of Numeral Cards 1-100

$14 + 9 =$

$29 + 4 =$

$23 + 6 =$

$13 + 7 =$

$24 - 9 =$

$36 - 8 =$

$53 - 8 =$

$79 - 9 =$

$4 \times 3 =$

$9 \times 5 =$

$7 \times 2 =$

$2 \times 4 =$

$14 \div 2 =$

$9 \div 3 =$

$36 \div 6 =$

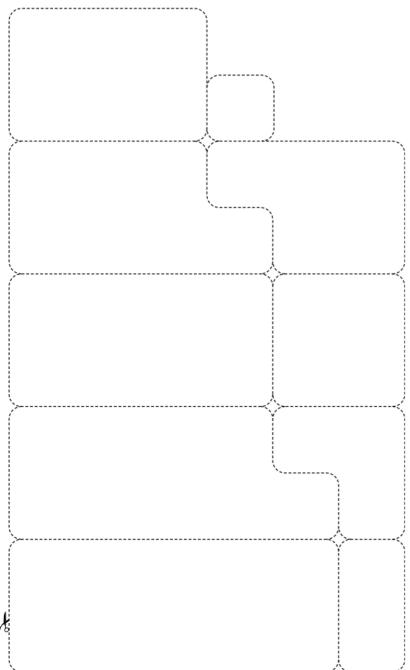
$81 \div 9 =$

< >

< >

# Photocopy Masters (PCM)

Subtracting Covers 48



Number, Pattern and Calculating 5

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## Apparatus



Numicon shapes



0-100 Number line



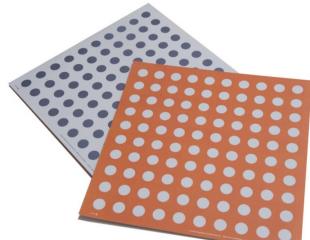
Numicon Display  
number line



Counters



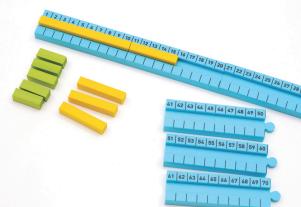
Numerical cards



Baseboard laminates -Use the  
grey side with whiteboard  
marker pens



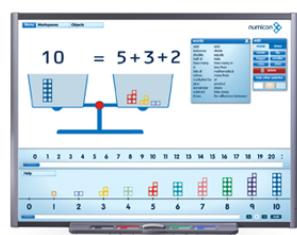
Cuisenaire Rods



Number rod track



Feely Bag



Numicon  
Interactive  
Whiteboard  
Software

**Strand and title:**

Date:

Strand and title:	Monday Class Warm-up:	Tuesday Class Warm-up:	Wed Class Warm-up:	Thurs Class Warm-up:	Friday Class Warm-up:
Short-term planning					
Activity groups					
Learning opportunities for the class	•				
Words and terms for use in conversation					
Assessment opportunities	Look and listen for children who: •				
Focused Group Work					
Independent Work					
Plenary- Whole class					
Resources	Homework: Explore More pp.				Assessment: Explorer Progress pp.

Name ..... Date ..... / ..... / .....

**Ones****Tens****Hundreds**