numicon®

Online
Numicon 1 Sample

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Teaching progressions for the year

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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 imagining common 2D shapes
Measurement	1	Comparing, ordering and measuring lengths
Measurement	2	Introducing the 1p, 2p
Calculating	3	Money
		NPC Milestone 4

The money will be updated to $ and c in the NZ Version for 2025

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Strand and Activity Group Number		Activity Group Title
Numbers and the Number System	2	Finding how many by grouping
Measurement	3	Units of time
		GMS Milestone 1
Geometry	2	Making pictures, shapes and patterns
Calculating	4	Exploring adding and subtracting facts to 10
Measurement	4	Comparing, ordering and measuring heaviness
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

SAMPLE

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

Key Mathematical Ideas provide a summary of the important concepts covered this week

Learning Opportunities are linked with the Assessment opportunities, detailing the range of Focus Activities for this week

Assessment is supported by Explorer Progress activities at the end of the week or later. These are recorded along with the Milestones to provide a record of learning that is stored in the assessment Tracker

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I: Measuring and comparing heights

Quit activity

Intro | Links | 1 | 2 | 3 | +

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

Have ready:

- Two toy figures of differing heights
- Number rods
- Words and Symbols for Calculating (cut from photocopy master 42a)

I: Measuring and comparing heights

Quit activity

Intro | Links | 1 | 2 | 3 | +

Links:

Full activity group overview
Starter image
Whole-class practice
Photocopy masters
Implementation guide
IWB Software
MyMaths

Next steps:

Explorer Progress Book Ic, pp. 6–7
Explore More Copymaster 27: Busy Bees
Numicon I Milestone Assessment cards (NPC I:6e and NPC I:6f)
Numicon I Milestone Tracking chart

42a **Words and Symbols for Calculating**

+	−	=	and
+	−	=	and
<	add		plus
<	add		plus
>	take away		
>	take away		

Number, Pattern and Calculating 1 © Oxford University Press 2014. This page can be copied for use in the purchasing school.

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Practice and discussion: Whole-class

- Discuss with children how and when the mathematics they have been learning could help them in solving problems.
- Tell children adding or subtracting stories and ask them to make the action for the operation they would use to solve the problems.
- Play a game with children. They will need a set of Numicon Shapes each, or per pair. Say, 'I have two Shapes in the Feely Bag and their difference is 1. One of them is a 7-shape. What could the other Shape be?' Children are allowed to ask indirect questions to help them identify the Shape. Listen for children who understand that there is more than one possible answer, and for those who ask appropriate indirect questions, e.g. 'Is it larger than the 7-shape?' Repeat for larger differences.
- Write a subtracting sentence on the board. Ask children to read it, find the Numicon Shapes or number rods to answer it and complete the sentence

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Implementation Guide

Arithmetic operations, or the four rules: adding and subtracting

In Number, Pattern and Calculating 1, we are concerned principally with introducing two arithmetic operations: adding and subtracting.

In relation to adding and subtracting, children learn: structures (the forms in which adding and subtracting occur); methods (how to do the calculations) and properties (characteristics and relationships to each other).

Structures for adding and subtracting
There are usually thought to be two adding structures: **aggregation** and **augmentation**.

Aggregation is putting together. Two or more amounts or numbers are put together to make a total or sum, e.g. 'Jonny picked two apples from a tree. Tim picked three apples. How many apples did they have in total?'

Augmentation is about increasing. Typically, when one amount is increased or made bigger, e.g. 'Last year Rajesh was 103 cm tall. He has grown 3 cm. How tall is he now?'

With subtracting, there are usually thought to be four structures: **take away, decrease, comparison** and **inverse of adding**. Already, you can see one big reason children find subtracting more difficult: it is much more complicated than addition.

Take away refers to those situations where something is lost, or one thing is taken away from another, e.g. 'Gemma has six sweets. She eats three. How many does she have now?'

Decrease is about reduction, e.g. 'A watering can holds 5 litres of water. Pieter pours out 2 litres. How much is left in the can?'

Comparison is where two amounts are being compared and we want to find the difference, e.g. 'Samir has 10 p and Nihal has 12 p. What's the difference between the amount of money Samir and Nihal have?'

The **inverse of adding structure** is about wanting to know how much more of something we want or

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

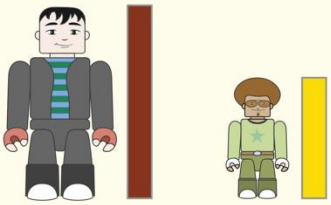
1: Measuring and comparing heights

Quit activity

Intro | Links | 1 | 2 | 3 | +

Step 1

Ask children to look at two toy figures of different heights. Ask how we could find out how much taller or shorter one is than the other. Some children may suggest measuring the figures, but ask whether they think number rods could be helpful. Look and listen for children who suggest placing two different number rods, e.g. the 8-rod and the 5-rod, next to the figures (see image).



1: Measuring and comparing heights

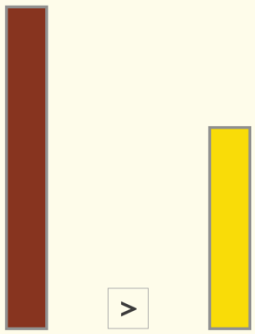
Quit activity

Intro | Links | 1 | 2 | 3 | +

Step 2

Ask children if they could place the '<' or '>' symbol (photocopy master 42a) between the rods to show the comparison (see image).

Ask children if they can remember how we usually read the '>' and '<' symbols when comparing numbers. Listen for children who are confident using the language 'is greater than' and 'is less than'.



1: Measuring and comparing heights

Quit activity

Intro | Links | 1 | 2 | 3 | +

Step 3

Extend the work by asking children to find the difference between the heights of the figures. Look and listen for children who suggest comparing the number rods to show the difference, and those who can show and say that the difference between the two figures is, e.g. the 3-rod (see image).

1: Measuring and comparing heights

Quit activity

Intro | Links | 1 | 2 | 3 | +

Paired work

Have ready: Numicon Feely Bag, number rods, Words and Symbols for Calculating (cut from photocopy master 42a)

Place number rods 1–10 in a Feely Bag. Partners choose a number rod each from the Feely Bag. They compare the lengths of the rods and place the '<' and '>' symbols (photocopy master 42a) between them. Together they find the rod that shows the difference between the two rods.

42a Words and Symbols for Calculating

+	−	=	and
+	−	=	and
<	add		plus
<	add		plus
>	take away		
>	take away		

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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

Have ready:

- Numicon Shapes
- Two similar clear plastic bottles containing different amounts of dry sand (or coloured liquid)
- Two different-shaped clear plastic bottles containing different amounts of dry sand (or coloured liquid)
- Selection of smaller containers (e.g. large plastic lids) for measuring
- Words and Symbols for Calculating (cut from photocopy master 42a)

Step 1

Show children two *similar* bottles containing different amounts of sand. Ask which they think contains more sand and which contains less. Discuss children's suggestions and ask how they know. Look and listen for children who notice the different levels of sand in the two bottles, and which one is higher.

Step 2

Show children two *different-shaped* bottles containing different amounts of sand. Ask which they think contains more sand and which contains less. Discuss children's suggestions. Look and listen for children who say it is difficult to tell which has more and which has less because the bottles are different shapes.

Ask children to suggest ways of solving the problem. Show them a selection of small containers they could use. Children may suggest pouring sand into the two similar bottles and comparing the levels.

Try this and discuss whether this would work for any amount of sand. What if there was so much sand that it didn't fit into the containers? Ask children if there are any other ways of doing it. Look and listen for children who suggest using one of the smaller containers to find out how much sand each bottle contains, by pouring the sand into the smaller container and counting how many times it can be filled from each of the bottles. The two numbers can then be compared to work out which bottle had more sand, and which had less.

Step 3

Work with children to try out the suggestion, or model it for them. Later they can try the idea out independently (see Paired Work in the + section).

Ask children whether they could use anything to help them keep count of how many times the smaller container is filled. Look and listen for children who suggest noting a number each time they fill the container, or using, e.g. a counter or Peg. Discuss their suggestions.

Ask if they could use Numicon Shapes to help. Children may suggest collecting a 1-shape for each full container, or picking up the next Shape each time a container is filled.

Step 4

When the number of times the small container is filled from each bottle has been counted, ask children to show the amounts with Shapes. Compare the Shapes and discuss which bottle had more sand in it, and which had less.

Step 5

Ask children how we could show the comparison between the Shapes using the '<' and '>' symbols (photocopy master 42a). Listen for children who can explain why they are placing their symbol where they are, e.g. 'This Shape has more holes than that one, so that Shape has fewer holes than this one' (see image).

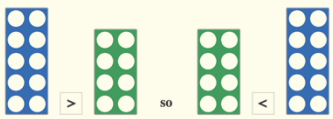
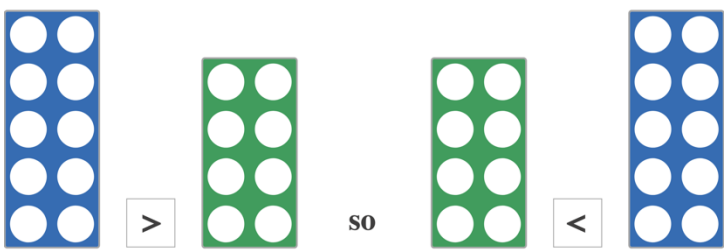
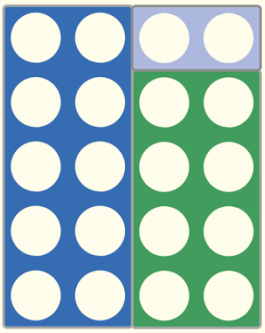


Image link to show on screen or print for discussion



Step 6

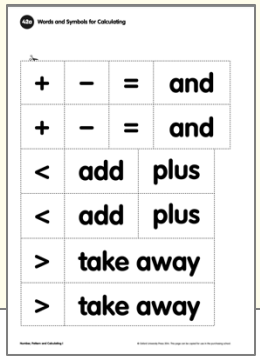
Extend the work by asking children to find the difference between the number of times the small container was filled from each bottle. Look and listen for children who suggest comparing the Shapes to find the difference. Ask them to show this difference with Shapes (see image). Also listen for those who can say the difference between the containers.



Paired or small group work

Have ready: Numicon Shapes, different-shaped plastic containers containing different amounts of dry sand or water, selection of smaller containers (e.g. large plastic lids) for measuring, Words and Symbols for Calculating (cut from photocopy master 42a)

Children need plenty of opportunities to explore volume using containers of differing sizes, finding out how many times a smaller container can be filled from a larger one and to make comparisons between different containers. Repeat Activity 2 independently.


Words and Symbols for Calculating

+	−	=	and
+	−	=	and
<	add		plus
<	add		plus
>	take away		
>	take away		

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: numicon

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

Have ready:

- Small squares of paper (all the same size)
- Coloured pencils or felt-tip pens
- Large sheet of paper with horizontal axis drawn on it
- Marker pen
- Metre stick

Step 1

Discuss the topic of fruit with children. Tell them that you want to collect some information about children's favourite fruit. Discuss and decide with them how to collect this data. Consider things such as which categories will be used, e.g. apple, orange, banana, grapes, strawberries and 'other', how the categories will be organized, how children will show their information. (If this is new to children, you can help collect the data.)

Step 2

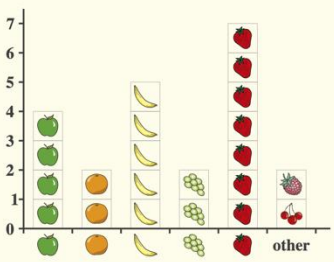
Children draw their favourite fruit on a small square of paper, or use the chosen method of representing it.

Step 3

Display a large sheet of paper with a horizontal axis drawn on it. Label the axis with the different fruits chosen. Ask children to stick their squares above the correct fruits. Explain that it is important for children to place their squares carefully, one above the other, so that the heights of the different stacks of squares can be compared. Look for children who are clear about where to stick their square.

Step 4

Discuss the pictogram children have made. Ask questions about the data collected, e.g. 'Does it show clearly which fruit is the most popular?' 'Which fruit is the least popular?' 'Are any equal?' 'Can children easily see how many people have said apples are their favourite fruit?' 'What might it be helpful to do to make this very clear?' Listen for children who suggest adding numerical values to show the totals. Draw and number the vertical axis (see image).



Step 5

Continue to discuss what children notice about the data. Ask 'difference' questions, e.g. 'What is the difference between the number of children who like strawberries the most and the number of children who like grapes the most?'

Look for children who are able to compare the different data by using the numerical values. Ask questions such as: 'Is it possible to find out how many more children like bananas than like oranges?' 'How many people altogether like grapes and strawberries?' 'Do fewer people like strawberries than apples?'

Children enjoy collecting data and constructing simple pictograms. Give them opportunities to do this, with support, whenever possible. Use questions like those in Steps 4 and 5 to help them discuss their data.

4: Writing 'the difference between ... and ... is ...' using word cards

Quit activity

Intro | Links | 1 | 2 | 3 | + | +

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:

numicon

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

Have ready:

- Numicon Shapes and Feely Bag
- Number rods
- Words and Symbols for Calculating (cut from photocopy masters 42a and 42b)
- Numeral Cards 1–10 (cut from photocopy master 21)

the difference between	9	and	6	is	3
or					
the difference between	6	and	9	is	3

the difference between		
minus	subtract	is
makes	balances	
equals	leaves	

Words for Calculating 42b

42a Words and Symbols for Calculating

+	−	=	and
+	−	=	and
<	add	plus	
<	add	plus	
>	take away		
>	take away		

Numeral Cards 0–10 21

0	1	2	3
0	1	2	3
4	5	6	7
4	5	6	7
8	9	10	
8	9	10	

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

Busy Bees

How this will help your child

- This activity will help your child to subtract by comparing two numbers to find the difference in their values.
- It will also encourage them to compare two numbers and find how many more are needed to reach the larger one.

Words and phrases to use

subtract, difference, the difference between, 'how many more to reach…?', equals

You will need

- Card Numicon Shapes 1–10
- A hat (or something to 'hide' the Shapes in)
- Scissors

During the activity, look at what your child can do

- See the difference in value when comparing two Numicon Shapes and know that finding the difference is subtracting.
- Compare two Numicon Shapes and see how many more are needed to reach a given number.

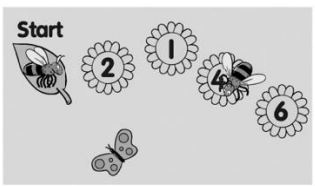
What to do

- Place your child's card Numicon Shapes 1–10 in a hat.
- Cut out the two bee counters from the Busy Bees sheet and place them on the starting square of the game sheet.
- Explain to your child that the bees are flying around the garden collecting nectar from the flowers. Finding the differences between two Numicon Shapes will show where the bees should land next.
- The first player takes two Shapes and finds the difference between them. 1
- They then move their bee counter to the next space showing that difference. 2
- Put the Shapes back in the hat.
- The second player then has a turn.
- Carry on taking turns until one of the bees reaches the hive.

Next steps…

- Choose two everyday objects and compare their size.
- Take turns with your child to set out some objects, e.g. buttons or small toys, into a Numicon Shape pattern. Point to a pattern, e.g. 6, and challenge them to work out how many more objects they need to reach a higher number, e.g. to make a 6-pattern into a 9-pattern. Have extra objects ready for your child to set out and check their answer.

1



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Explore More
– for class and home

Activities for class and home offer further opportunities for children to explore maths in an engaging way.

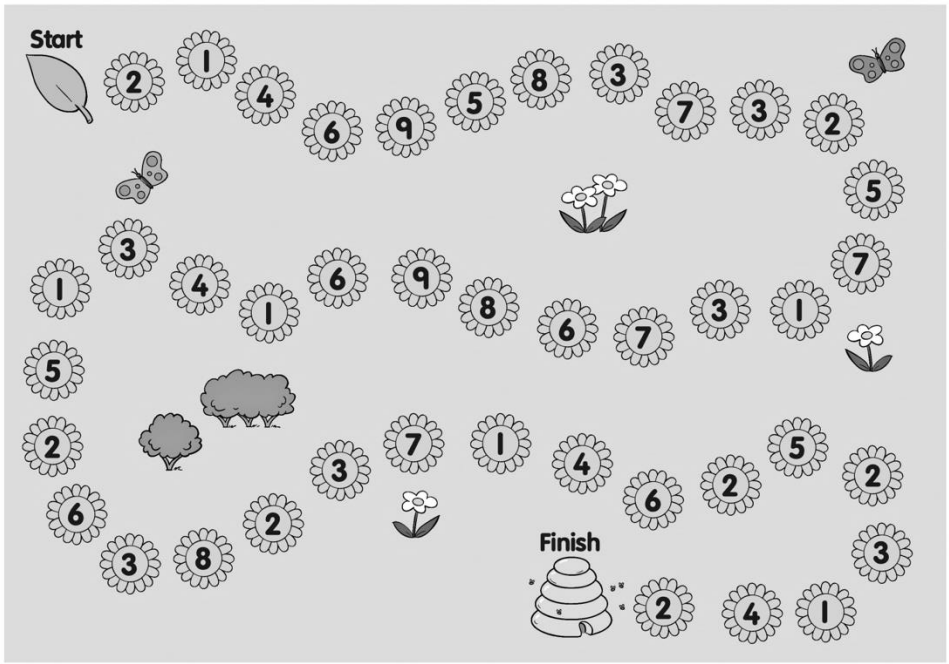
A clear guide and suggestions on how to extend the activity

Practical real-life contexts help children think about how maths can be used and applied

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

27

Busy Bees



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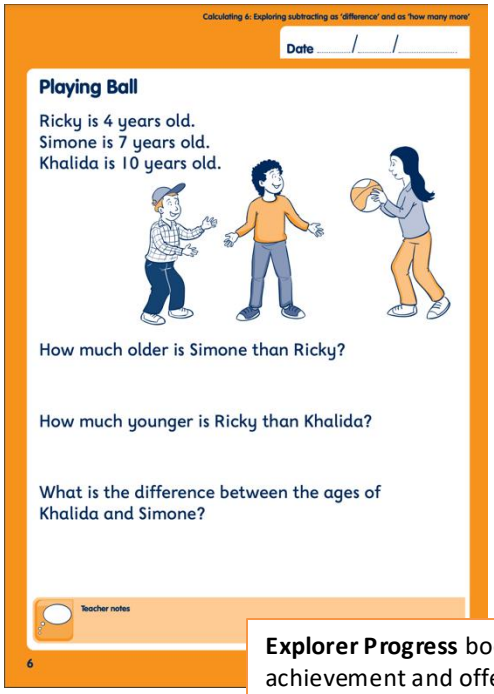
Milestone
ASSESSMENT CARDS

Explorer Progress
– weekly assessment tool


Calculating 6: Exploring subtracting as 'difference' and as 'how many more'

Date ..../..../....

Playing Ball

Ricky is 4 years old.
Simone is 7 years old.
Khalida is 10 years old.

How much older is Simone than Ricky?

How much younger is Ricky than Khalida?

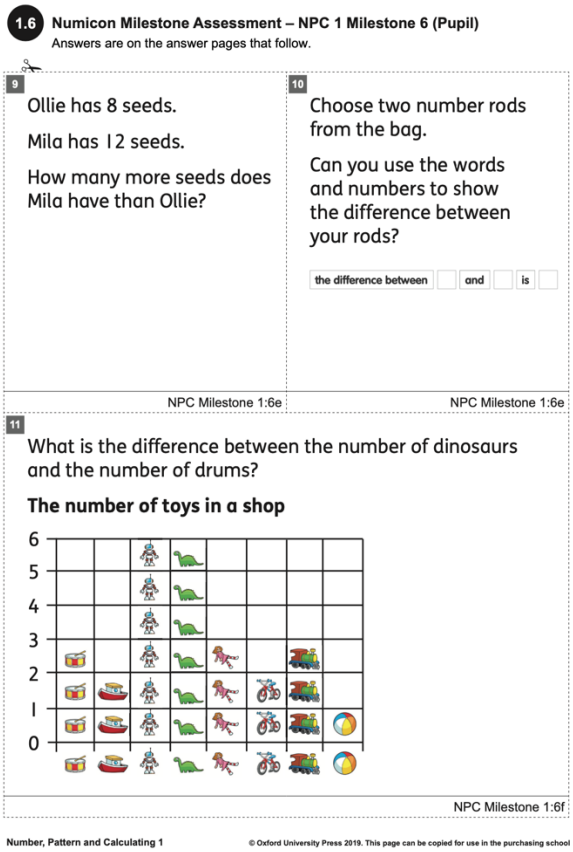
What is the difference between the ages of Khalida and Simone?

Teacher notes

6

Explorer Progress books provide a record of achievement and offer an individual chance to see children's thinking, monitor their progress and assess their understanding

Open activities give you the opportunity to see how well children can use and apply the maths learning in new contexts.


1.6 Numicon Milestone Assessment – NPC 1 Milestone 6 (Pupil)
Answers are on the answer pages that follow.

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

6
5
4
3
2
1
0

NPC Milestone 1:6f

Number, Pattern and Calculating 1

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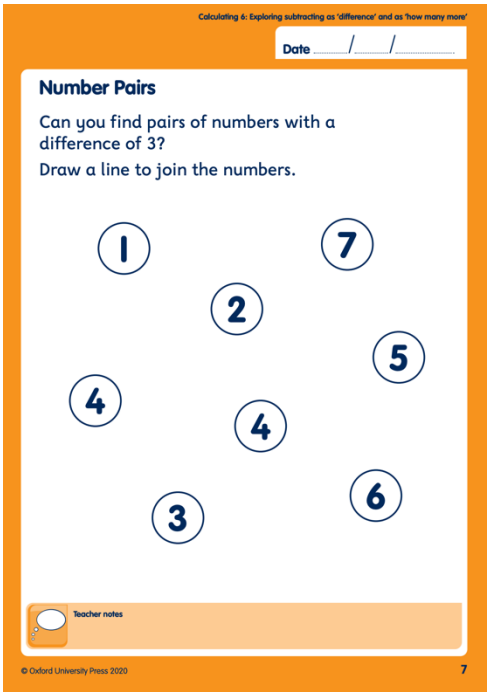
Calculating 6: Exploring subtracting as 'difference' and as 'how many more'

Date ..../..../....

Number Pairs

Can you find pairs of numbers with a difference of 3?
Draw a line to join the numbers.

1 7 2 5 4 4 6 3

Teacher notes

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7

Assessment Tracker
– weekly assessment tool

Milestone	Code	NPC / GMS	Numicon strand	AG	NC strand	John Smith	
Number, Pattern & Calculating 1 Milestone 6						Started	Not started
By this point, children should be able to:						3 out of 6	0 out of 6
• Use the terms odd and even when referring to numbers and totals; name odd and even numbers (to 10)	NPC 1:6a	NPC	P&A	P&A3	Addition & subtraction		
• Count in 2s, 5s and 10s supported by structured apparatus	NPC 1:6b	NPC	NNS	NNS3	Number & place value		
• Instantly recognize Numicon Shape patterns and number rods as representations of numbers	NPC 1:6c	NPC			Number & place		
• Fluently recall adding and subtracting facts of numbers to 10 and use these when calculating and solving real problems	NPC 1:6d	NPC					
• Begin to understand 'how many more?' as a way of finding an answer to a subtracting problem	NPC 1:6e	NPC					
• Solve 'difference' problems in a data handling situation	NPC 1:6f	NPC	C	C6	Addition & subtraction		

GREEN – Achieved
ORANGE – on the way
RED – to target
WHITE – not started

Your next steps…

Find out how Numicon can make a difference in your school and discover Numicon's potential, **arrange an appointment, or Professional Development with us:**

Web: www.numicon.co.nz and www.edushop.nz

Email: info@numicon.co.nz

Phone: 0800 678 581