The National Strategies
Primary

Numbers and patterns: laying foundations in mathematics

department for
children, schools and families

Numbers and patterns: laying foundations in mathematics

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Contents

Introduction **7**

The materials 7

The focus 8

The structure 8

Accessing the materials 9

Mark making 10

How *Numbers and patterns: laying foundations in mathematics* relates to the EYFS Development Matters statements and the Year 1 Primary Framework objectives 11

Appendix 1: Glossary of terms used within *Numbers and patterns: laying foundations in mathematics* 22

Observation, assessment and planning **1**

Introduction 1

What to look for when observing young children's mathematical development: an *aide-mémoire* 5

Steps in learning **1**

Introduction 1

Numbers and patterns phases 2

Number words and numerals – skills and potential difficulties 4

Counting sets – skills and potential difficulties 10

Models and images 16

Enabling environments **1**

Introduction 1

Enabling environments: construction 3

Enabling environments: daily routines 5

Enabling environments: large play 7

Enabling environments: malleable 9

Enabling environments: mark making 11

Enabling environments: role-play 13

Enabling environments: sand 15

Enabling environments: small world 17

Enabling environments: sound patterns 19

Enabling environments: table games 21

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Enabling environments: visual patterns 23

Enabling environments: water play 25

Role of the adult **1**

Introduction 1

Number words and numerals: Phase 1 5

Number words and numerals: Phase 2 12

Number words and numerals: Phase 3 19

Number words and numerals: Phase 4 26

Number words and numerals: Phase 5 33

Number words and numerals: Phase 6 39

Counting sets: Phase 1 45

Counting sets: Phase 2 51

Counting sets: Phase 3 58

Counting sets: Phase 4 65

Counting sets: Phase 5 74

Counting sets: Phase 6 82

Developing mathematics through a theme: Having a party 88

Supporting material **1**

Key messages 1

Learning environment audit 4

Auditing the use of the environment to support and develop mathematical speech, language and communication 9

Extracts from *Mark making matters* 11

Extracts from *Children thinking mathematically: PSRN essential knowledge for Early Years practitioners* 16

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Numbers and patterns: laying foundations in mathematics

Introduction

The materials

Welcome to *Numbers and patterns: laying foundations in mathematics*. This set of resource materials is intended to help practitioners working with children in the Early Years Foundation Stage (EYFS), and teachers working with lower Key Stage 1 children, to plan their mathematics provision and help children to secure some of the key mathematical ideas that they will use throughout the rest of their lives. The materials have a strong focus on Number, particularly counting, and the children's developing understanding of the patterns that underpin early work within this aspect of mathematics.

It is vital to lay secure foundations in early mathematics. We want young children to engage with numbers and to see how to use them in their everyday environment for labelling, quantifying and calculating: in other words, giving children the tools to help them to develop a better understanding of the world in which they live. Counting is a significant aspect of children's early understanding of number and is the foundation on which quantifying and calculating are built. These *Numbers and patterns: laying foundations in mathematics* materials are intended to help practitioners and teachers introduce young children to a broad experience of counting. Using these materials will help to provide children with the skills they need to support further learning and enquiry, giving them the confidence to 'have a go' and to develop their understanding and skills. It provides the important start in life that will help to overcome the fears and reluctance to engage in mathematics that adults will often admit to. It will help to turn an 'I can't' attitude towards mathematics into the more positive 'I can and I do.'

These materials comprise ideas and guidance on how to plan, prepare for and support children in their early stages of learning mathematics and on how to assess children's learning to inform next steps in planning. While *Numbers and patterns: laying foundations in mathematics* is aimed at children in the EYFS and early Key Stage 1, it is intended to be used flexibly, with the materials being adapted to meet the learning needs of the children wherever they are on their mathematics learning journey. The materials can be tailored to meet the needs of an individual, group or class. The aim is to ensure that all children become competent counters and can operate comfortably within the expectations set by the practitioner and teacher drawing on the EYFS and Primary Frameworks.

We hope that you will find these materials useful when planning your mathematics provision for children. The overall aim is to stimulate and engage children's interest and joy in numbers, in ways that inform and secure their learning. While the mathematics of number is vast, the early ideas are the all-important blocks that form the structure. We hope the resources will help you to ensure that children acquire the number foundations on which they can build their future learning.

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The focus

The materials in *Numbers and patterns: laying foundations in mathematics* focus on key aspects of Numbers as Labels and for Counting and Calculating in the EYFS Development Matters guidance. They extend into the equivalent aspects of the Year 1 objectives from the Counting and understanding number and Calculating strands of the Primary Framework for mathematics. These materials have been structured around the following two themes to ensure that children experience high-quality teaching in two aspects of counting:

- *Number words and numerals* – the ability to say number names in order;
- *Counting sets* – the ability to count objects, in order to find out how many there are in a set.

Throughout these two themes importance is given to children recognising, using and memorising patterns and structured arrangements through familiarity with and regular practice in counting. Patterns in number names, the rhymes and rhythms in sounds and visual links all play a part in learning mathematics. As children being to learn how the patterns are structured and how their underlying formation can be applied to new contexts, the memorisation becomes easier and the recall more immediate. *Numbers and patterns: laying foundations in mathematics* emphasises the role that pattern identification can play in helping children to acquire a secure conceptual framework around number and counting, using all their senses in the process while working in the indoor and outdoor environments.

The structure

Numbers and patterns: laying foundations in mathematics is structured around six developmental phases that are linked to the two themes: Number words and numerals and Counting sets. These developmental phases have been informed by the Development Matters statements from the EYFS framework and the Year 1 learning objectives from the Primary Framework. The two themes of Number words and numerals and Counting sets are organised in parallel, to help you see how they might be developed together. Children will move through these development phases and stages in learning, as they secure their understanding of number and counting; however this journey will not necessarily be the same for every child. This guidance sets out these developmental phases to help you in your planning and assessment of children's learning; they do not set out a 'one and only one' pathway that every child must follow.

There are six sections to this resource.

- **Introduction to *Numbers and patterns: laying foundations in mathematics*** provides an overview of the structure of the materials, how they can be accessed and how they relate to the Development Matters statements and the Year 1 Primary Framework objectives.
- **Observation, assessment and planning** includes guidance on how these all support children's development and learning in mathematics, together with an example of an observation schedule that you might adapt to help you carry out assessments of children's learning.
- **Steps in learning** includes charts outlining the phases within the Numbers words and numerals and Counting sets themes, and potential difficulties children might encounter as they develop and secure their learning, together with guidance on the use of models and images.
- **Enabling environments** has 12 cards that provide examples of how children's learning in mathematics can be supported through an enabling environment, to provide a more seamless learning experience for young children.

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- **Role of the adult** illustrates how adults can support and extend children's mathematical learning. It offers examples of how to interact with children's freely-chosen play and some starting points for activities that can be adapted and planned in more detail, to use when working with children within a particular phase of learning.
- **Supporting material** provides additional key messages, audits and extracts from related publications.

Accessing the materials

These materials have been structured to provide flexible use of the four main sections: 'Observation, assessment and planning', 'Steps in learning', 'Enabling environments' and 'Role of the adult'.

Points to remember

- The materials can be used with individuals, small groups or classes, depending on the age and experience of the children.
- The suggestions should be used flexibly, enabling you to match activities to the needs of children.
- The use of practical resources, everyday and real-life situations offers children contexts that emphasise the role mathematics can play in their own and other's lives.
- The activities should enable all children to engage in counting and related number work and help them to become competent counters.
- Providing children with regular opportunities to use and develop mathematical vocabulary and language structures is essential; such opportunities enable children to talk about their mathematics and share their thinking and ideas with others.
- Children need to hear, see, use and talk about numbers.
- Through an enabling environment, engage children with opportunities to apply their skills in number and counting and to build their mathematical language.
- Number words, numerals, counting sets and pattern can have a place in all areas of learning; look out for them and capitalise on these opportunities.
- Counting is a skill that enables children to engage with and enjoy other areas of learning; children who know why they are counting become better at counting.
- Counting rhymes, books and songs help children to develop their understanding of number and counting and to remember the patterns involved.
- Children learn to recognise numbers through play and real-life experiences.
- Children learning English as an additional language benefit from using number words and counting within their first language.
- All children are entitled to rich and enjoyable learning experiences which are engaging, stimulating and fun.

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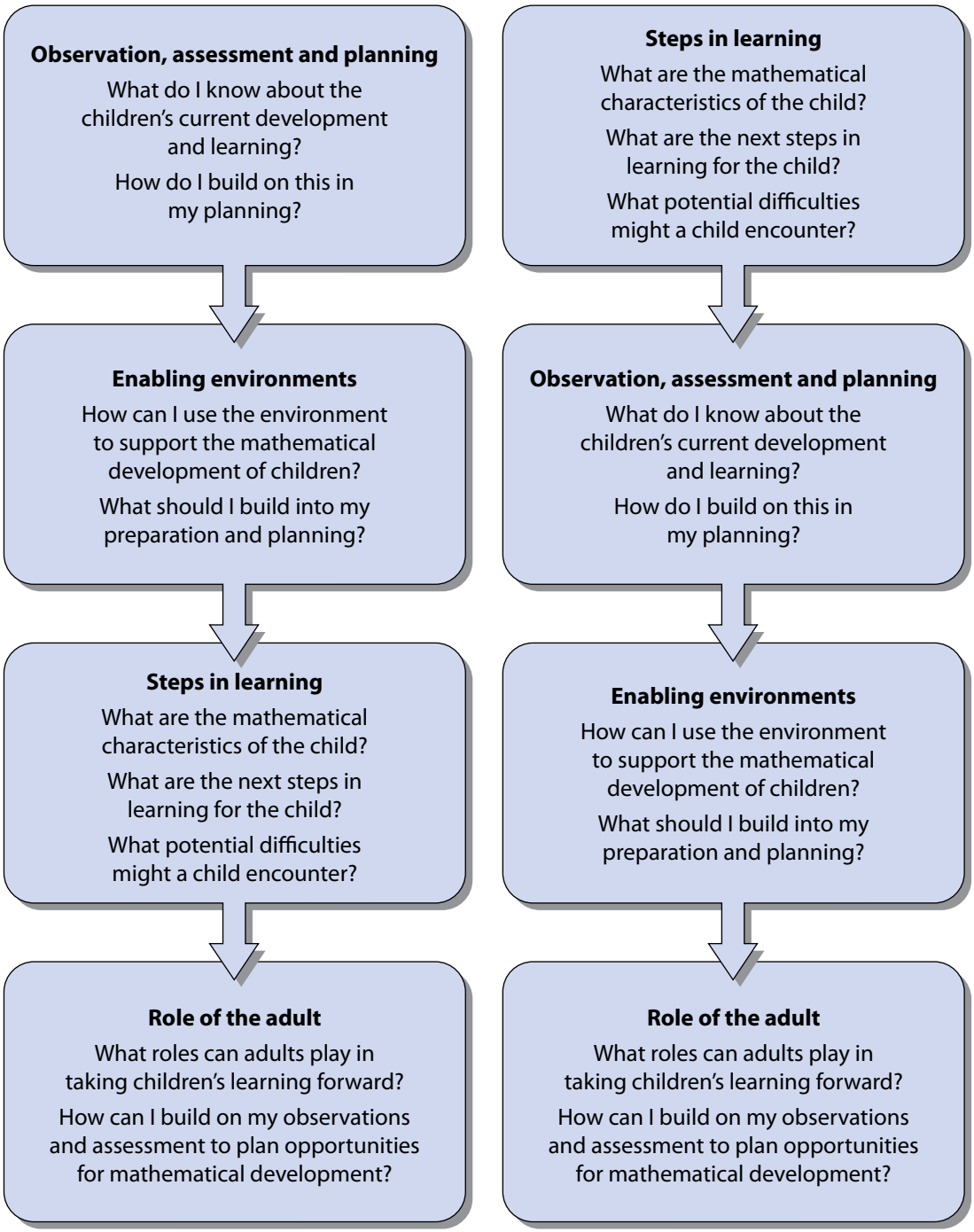
The two flowcharts below show alternative examples of how you might access the materials in *Numbers and patterns: laying foundations in mathematics* and make effective use of the resources.



Mark making

This publication focuses upon children's ability to recognise, say and identify numerals, rather than on developing their skills in writing numbers. The section on 'Enabling environments' provides support materials giving examples of ways in which children may encounter and use written numbers and some suggestions for how to encourage children to begin to make marks to support their mathematical thinking.

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Within the supporting material, you will find two extracts from related publications *Mark Making Matters – Young children making meaning in all areas of learning and development* and *Children thinking mathematically: PSRN essential knowledge for Early Years practitioners*, which provide further reading on developing children's mathematical mark making.

How *Numbers and patterns: laying foundations in mathematics* relates to the Development Matters statements and the Year 1 Primary Framework objectives

The following chart illustrates how the learning focuses within the Numbers and patterns themes and phases relate to the Development Matters statements, the Early Learning Goals and EYFS Profile scale points and Year 1 objectives from the Primary Framework.

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Numbers as labels for counting	**16–26 months**		
	Say some counting words randomly		
	Distinguish between quantities, recognising that a group of objects is more than one	• Distinguish between quantities, recognising when a group of objects is more than one (CS Phase 1)	
	Gain awareness of one-to-one correspondence through categorising belongings, starting with 'mine' or 'Mummy's'	• Show awareness of one-to-one correspondence through practical everyday experience (CS Phase 1)	
	22–36 months		
	Have some understanding of 1 and 2, especially when the number is important for them		
	Create and experiment with symbols and marks		
	Use some number language, such as 'more' and 'a lot'	• Use some number language, such as 'more' and 'a lot' (CS Phase 1)	
	Recite some number names in sequence	• Say some number names in sequence (NWN Phase 1)	

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Numbers as labels for counting	**30–50 months**		
		• Recognise and continue repeating patterns (NWN Phase 1)	
	Use some number names and number language spontaneously	• Show an awareness of numbers in their environment (NWN Phase 1)	
	Show curiosity about numbers by offering comments or asking questions	• Offer comments or ask questions about numbers, demonstrating their curiosity (NWN Phase 1)	
	Use some number names accurately in play	• Use some number names and number language accurately (NWN Phase 1)	Says some number names in familiar contexts, such as nursery rhymes (NLC1)
	Sometimes match number and quantity correctly	• Appreciate that numbers can identify how many objects are in a set (CS Phase 2)	
	Recognise groups with one, two or three objects	• Recognise groups with one, two or three objects (CS Phase 2)	

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Numbers as labels for counting	**40–60+ months**		
	Count up to three or four objects by saying one number name for each item	• Count up to five objects by touching each object and saying one number name for each item (CS Phase 2)	Counts reliably up to three everyday objects (NLC2)
	Know that numbers identify how many objects are in a set	• Know that the last number in the count gives the total (CS Phase 2)	
	Recognise some numerals of personal significance	• Recognise some numbers of personal significance (NWN Phase 2)	
	Recognise numerals 1 to 5	• Recognise, say and identify numerals 1 to 5 (NWN Phase 2) • Order numbers in the range 1 to 5 (NWN Phase 2)	
	Say and use number names in order in familiar contexts	• Count forwards and backwards within the number sequence 1 to 5 (NWN Phase 2) • Count forwards and backwards within the number sequence 1 to 10 (NWN Phase 3)	Says number names in order (NLC4)
	Count out up to six objects from a larger group	• Count out a smaller number of objects (up to six) from a larger group (CS Phase 3)	Counts reliably up to six everyday objects (NLC3)
	Begin to represent numbers, using fingers, marks on paper or pictures	• Represent numbers up to five, using fingers (CS Phase 2) • Represent numbers up to ten, using fingers (CS Phase 3)	

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Numbers as labels for counting	**40–60+ months (continued)**		
	Count actions or objects that cannot be moved	• Count actions or sounds (CS Phase 3)	
	Count an irregular arrangement of up to ten objects	• Count reliably up to ten objects, including those that cannot be moved (CS Phase 3)	
	Match then compare the number of objects in two sets	• Match and compare the numbers of objects in two sets, recognising when the sets contain the same number of objects (CS Phase 3)	
	Select the correct numeral to represent one to five, then one to nine objects	• Order numbers in the range 1 to 9 (NWN Phase 3)	Orders numbers up to ten (NLC7)
	Recognise numerals 1 to 9	• Recognise, say and identify numerals 1 to 9 (NWN Phase 3)	Recognise numerals 1 to 9 (NLC5)
		• Introduce the empty set (0) (CS Phase 4) • Use zero and the numeral to represent it (NWN Phase 4) • Recognise, say and identify numerals 0 to 9 and beyond (NWN Phase 4)	
	Count reliably up to ten everyday objects	• Count reliably any arrangement of up to ten objects (CS Phase 4) • Recognise that the number of objects in a set does not change if they are moved around (CS Phase 4) • Instantly recognise, without counting, familiar patterns of up to six objects (CS Phase 4)	Counts reliably up to ten everyday objects (NLC6)

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	EYFS Development Matters and Year 1 objectives Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Counting and understanding number/Numbers as labels for counting	**40–60+ months (continued)**		
	Estimate how many objects they can see and check by counting them	• Begin to estimate how many objects can be seen and check by counting (up to ten) (CS Phase 4)	
	Use ordinal numbers in different contexts	• Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts (NWN Phase 4) • Use the language of ordinal numbers in a range of contexts (NWN Phase 5)	
	Count aloud in ones, twos, fives or tens	• Count forwards in twos, fives or tens (NWN Phase 5)	
	Use developing mathematical ideas and methods to solve practical problems		Use developing mathematical ideas and methods to solve practical problems (NLC8)
		• Recognise and continue patterns linked to number (NWN Phase 4)	
	Year 1 objectives (continued on next page)		
	Compare and order numbers, using the related vocabulary; use the equals (=) sign	• Order numbers across the 10 boundary (e.g. 8 to 11) (NWN Phase 4) • Count forwards and backwards within the number sequence 1 to 20 (NWN Phase 4)	
	Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting	• Count reliably more than ten objects (CS Phase 5) • Instantly recognise, without counting, organised and random arrangements of small numbers of objects (CS Phase 5) • Estimate a number of objects that can be checked by counting (CS Phase 5)	

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	EYFS Development Matters and Year 1 objectives Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Counting and understanding number	**Year 1 objectives (continued)**		
	Read and write numerals from 0 to 20, then beyond; use knowledge of place value to position these numbers on a number track and number line	• Recognise, say and identify numerals up to 30 (NWN Phase 5) • Count forwards and backwards within the number sequence 0 to 30 (NWN Phase 5) • Recognise, say and identify numerals 0 to 100 (NWN Phase 6) • Count forwards and backwards within the number sequence 0 to 100 (NWN Phase 6)	
	Say the number that is one more or less than any given number, and ten more or less for multiples of ten	• Say the numbers that come before and after a given number within the number sequence 1 to 20 (NWN Phase 4) • Say the numbers that come before and after a given number within the number sequence 0 to 30 (NWN Phase 5) • Say the numbers that come before and after a given number within the number sequence 0 to 100 (NWN Phase 6) • Identify and explain simple patterns in the number sequence (NWN Phase 5)	
	Use the vocabulary of halves and quarters in context		

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Calculating	**16–26 months**		
	Learning to classify by organising and arranging toys with increasing intent Categorise objects according to their properties		
	22–36 months		
	Begin to make comparisons between quantities Know that a group of things changes in quantity when something is added or taken away	• Begin to make comparisons between quantities (CS Phase 1)	
	30–50 months		
	Compare two groups of objects, saying when they have the same number Show an interest in number problems	• Match groups with the same number of objects (one to three) (CS Phase 2)	
	Separate a group of three or four objects in different ways, beginning to recognise that the total is still the same	• Move around, or partition and recombine small groups of up to four objects, and recognise that the total is still the same (CS Phase 3)	

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Calculating	**40–60+ months**		
			Responds to the vocabulary involved in addition and subtraction in rhymes and games (C1)
	Say the number that is one more than a given number	• Say the number that comes after a given number within the number sequence 1 to 10 (NWN Phase 3)	Finds one more or one less from a group of up to five objects (C3)
	Find one more or one less than a number from one to ten	• Find one more or one less than a number from 1 to 10 (CS Phase 4)	Finds one more or one less than a number from 1 to 10 (C7)
	Find the total number of items in two groups by counting all of them	• Find the total number of objects in two groups by counting all of them (CS Phase 4)	Relates addition to combining two groups (C4)
	Select two groups of objects to make a given total of objects	• Partition and recombine small groups of up to ten objects (CS Phase 4)	

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	EYFS Development Matters Early Learning Goals in **bold**	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Calculating	**40–60+ months (continued)**		
	In practical activities and discussion, begin to use the vocabulary involved in adding and subtracting	• Find the total by combining two groups, where one group is screened (seen and then hidden) and counting on (CS Phase 5)	In practical activities and discussion, begins to use the vocabulary involved in adding and subtracting (C6)
	Begin to relate addition to combining two groups of objects and subtraction to 'taking away'	• Remove objects from a small group and count how many are left (CS Phase 4) • Remove a smaller number from a larger and find how many are left by counting back from the larger number (CS Phase 5)	Relates subtraction to taking away (C5)
	Use language such as 'more' or 'less' to compare two numbers	• Compare sets of up to 20 objects, using language such as 'more' or 'fewer' (CS Phase 5)	Recognises differences in quantity when comparing sets of objects (C2)
	Count repeated groups of the same size Share objects into equal groups and count how many in each group Use own methods to work through a problem		Uses developing mathematical ideas to solve practical problems (C8)

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	EYFS Development Matters Early Learning Goals in bold	Numbers and patterns learning focuses NWN = Number words and numerals CS = Counting sets	EYFS profile (Scale point in brackets)
Calculating	**Year 1 objectives**		
	Derive and recall all pairs of numbers with a total of 10 and addition facts for totals to at least 5; work out the corresponding subtraction facts Count on or back in ones, twos, fives and tens and use this knowledge to derive the multiples of two, five and ten to the tenth multiple	• Count forwards and backwards in twos, fives and tens (NWN Phase 6)	
	Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of ten to a one-digit or two-digit number	• Relate addition to counting on and recognise that addition can be done in any order (CS Phase 6)	
	Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences Solve practical problems that involve combining groups of two, five or ten, or sharing into equal groups	• Begin to find out how many have been removed from a larger group of objects by counting up from a number (CS Phase 5) • Understand subtraction as 'take away' and find a 'difference' by counting up (CS Phase 6)	
		• Count large groups of objects by using efficient strategies (CS Phase 6)	

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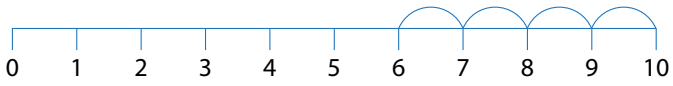
Appendix 1

Glossary of terms used within *Numbers and patterns: laying foundations in mathematics*

Cardinal number	The number of items in a set, the quantity but not the order of things. For example, 'There are five pencils in a pot, the price is £3.'
Conservation of number	If a group of objects is rearranged, the total number of objects stays the same.
Consecutive	Following in order. Consecutive numbers are adjacent in a count. For example, 5, 6, 7 are consecutive numbers. 25, 30, 35 are consecutive multiples of 5.
Digit	One of the symbols of a number system, most commonly the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. For example, the number 29 is a two-digit number; 5 is a one-digit number. The position or place of a digit in a number conveys its value.
Estimate	**Verb**: To arrive at a rough or approximate answer. **Noun**: A rough or approximate answer.
Fewer	Used to compare two or more sets of countable (discrete) objects. For example, 'There are fewer biscuits on this plate than on that plate,' or 'There are two fewer apples in this bag.'
Less	Used to compare 'uncountable' (continuous) quantities including measures. For example, 'This bottle has less water in it than that one.'
Number line	A line on which numbers are represented by points. Division marks are numbered, rather than spaces. They can begin at any number and extend into negative numbers. They can show any number sequence.  (See guidance models and images in the section on 'Steps in learning' for further details.)

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Number track	A numbered track along which counters may be moved. The number in a region represents the number of single moves from the start. • Each number occupies a cell and is used to number the cell. • Numbers may have a matching illustration. • Supports learning to read numbers in numerals. • Supports locating ordered numbers. • They should start at 1 and not 0. (See guidance models and images in the section on 'Steps in learning' for further details.)
Numeral	A symbol used to denote a number. For example, 5, 23 and the Roman V are all numbers written in numerals.
Ordinal numbers	A term that describes a position within an ordered set. For example, first, second, third, fourth… twentieth.
Partition	1. To separate a set into subsets. 2. To split a number into component parts. For example, the two-digit number 38 can be partitioned into 30 + 8 or 19 + 19.
Pattern	A systematic arrangement of numbers, shapes or other elements according to a rule.
Sequence	An ordered set of numbers or shapes arranged according to a rule.
Subitising	This is the process whereby we recognise the size of a set, its cardinality, from the pattern or structure without having to count the number of objects. For example, recognising there are five dots in this pattern.
Zero	1. Nought or nothing. 2. In a place-value system, a place-holder. For example, 105. 3. The cardinal number of an empty set.

Adaptation of QCDA Mathematics Glossary accessed via www.qcda.gov.uk. Used with kind permission.

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Observation, assessment and planning

Introduction

Observation, assessment and planning all support children's development and learning in mathematics. Planning starts with observing and listening to children, to identify how they learn and what learning they have acquired. This helps us to plan, taking account of children's current development and learning.

Observation

Observation involves watching the children, listening to them and taking note of key points, both seen and heard, that highlight the security of their learning and indicate where they are less sure or if they are experiencing difficulties. When working with children we should be ready to make a written or mental note of important learning indicators or barriers to progress. It is how we find out the specific needs of individual children or of a group of children.

Observation can be formal (planned) but much will be informal (spontaneous), carried out on a moment-by-moment basis as we work with children. Without observation, overall planning would simply be based on what we felt was important, engaging or interesting (or all three) but it might not necessarily meet the needs of the children.

Observation skills include:

- observing children in a way that is valuable to the child and makes best use of time;
- understanding what we are looking for, and taking account of the earlier assessments that have identified any barriers or gaps;
- understanding how the child's current development, and any particular way the child learns, may inform their response or their approach to a task;
- listening carefully to the child's use of language as they interact with different adults and children;
- noting important features of the child's responses, behaviour, learning and development, accurately;
- thinking about what we have seen and talking with the child's parents and other adults to help us clarify our thoughts;
- asking questions, when necessary, to clarify, confirm or reject ideas about what we have observed;
- being objective and not allowing preconceptions to influence how we observe, or interpret what we have observed.

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Assessment

We assess children's progress and attainment in mathematics by analysing our observations of their responses to stimuli or when they engage in activities or play. We should also collect information about children's learning needs from their parents and from other adults. The analysis of the information should help us to determine what the children know, understand and can do, and where they need further support to secure next steps in learning.

This is what good Assessment for Learning (AfL) practice involves. It is formative, based on observations, photographs, video, things that children have made or drawn and information from parents. It informs or guides everyday planning. We ask ourselves:

What does our observation and any other evidence of learning we have collected tell us about the child's learning and development? What was new – was there something we had not observed before?

When we do this regularly, we gather evidence of children's progress, over time, and gain insights into children's learning, their development and their needs.

Effective assessment involves evaluation or taking decisions about the child's progress, and their learning and development needs, and gives us the information to enable us to plan the next steps.

Planning and resourcing

In planning the next steps in children's development and learning of mathematics, we use our knowledge of the children's progress and achievements and our expectations and understanding of progression in the curriculum. This should be informed by what we have discovered from our own observations and assessments, and information collected from other sources, including the contributions of children themselves.

There are different ways of planning and each has a different purpose.

Long-term planning

This sets out the overall guidance contained in the EYFS and Primary Framework documents. Long-term planning provides a structure that helps to:

- identify clear long-term learning expectations, ensuring coverage of all the areas of learning in the EYFS and Primary Frameworks;
- identify the links between the different areas of learning, curriculum expectations and the teaching approaches and to think about how to provide a range of activities, for example, indoors and outdoors with quiet times and quiet spaces throughout the day;
- plan a combination of opportunities for supporting children's learning to benefit from a range of freely-chosen play activities and well-planned interesting adult-led activities that lead to particular learning and the acquisition and practice of skills and knowledge;
- inform and focus medium-term planning.

Medium-term planning

This usually outlines in some detail the overall programme for a period from two to six weeks. Medium-term planning generally covers:

- types of experience and activity appropriate to the group of children, supporting the different EYFS principles and expectations set out in the respective Frameworks;

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- overall daily routines, including the organisation and management of learning opportunities and provision such as outdoor activities, as well as indoor, quiet time, directed time, time for practical or practice work and for interaction between individual or very small groups and staff;
- main resources such as use of particular structured materials, arrangement of room to include role-play or quiet areas, provision of access to equipment for older children to use independently;
- strategies for observation and assessment, to evaluate individual needs further within small groups or the whole group;
- ways to inform and focus on short-term planning.

Short-term planning

This involves setting out what is to be included on a day-to-day basis, responding to the interests and needs of the children within the broad framework outlined above. This planning will be informed by ongoing observations and assessments and give a greater focus on specific children or groups and how their interests will be extended and their learning needs will be met. Plans should be flexible and adapted on an ongoing basis. Plans will include:

- the resources and learning materials and equipment that will be needed for the children and the practitioner or teacher;
- identification of the learning intentions for the children or groups of children and the teaching approaches that will be used to support the learning;
- how time is organised to ensure children can talk to an adult and to other children, and to use and apply their learning through engaging in freely-chosen play and well-planned adult-led activities;
- the observations and assessment to be carried out over the day;
- putting the EYFS principles into practice.

Observation, assessment and planning are linked; each one informs the others.

- It is important to build into planning opportunities for regular and thorough observations, incorporating space to think about what we have seen and heard.
- Pulling together and analysing the information and thinking about what it tells us forms the basis of our assessment. When we assess we are making a judgement or decision about the child's progress and needs in one or several areas of learning in mathematics.
- The decisions that we then take will inform our planning to help us to meet the mathematical needs of the individual and/or group of children and to build in opportunities to review children's learning and progress through observation.

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Diagram 1 shows this Assessment for learning cycle in action. It highlights the importance of planning for assessment and using the assessment information to inform planning.

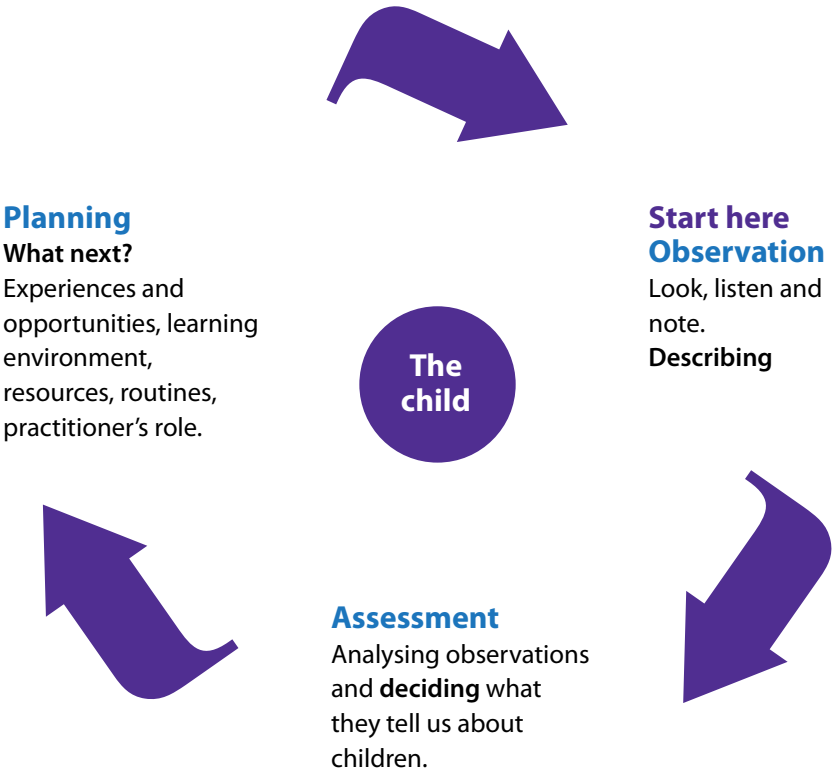

Diagram 1: The Assessment for learning cycle in action

Diagram 2 shows the importance of linking the Assessment for learning cycle to the learning and teaching cycle. This highlights the importance of ensuring that all children are given time when they get high-quality teaching, can practise what they have learned, to secure it, and then to apply it to new and different contexts, particularly those that involve them in problem-solving and reasoning.

Diagram 2: The learning and teaching cycle

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What to look for when observing young children's mathematical development: an *aide-mémoire*

What to look for, listen to and note in Number words and numerals and Counting sets

In observations of young children, notice how each child:

- is using all senses to explore and investigate the environment and open-ended resources;
- is making connections, for example, through repeated movements and/or patterns of play;
- is sorting, matching and comparing quantities in play and daily routines;
- shows enjoyment of and interest in representing numbers and patterns, using two dimensions, three dimensions, or through music, song and movement;
- refers to numbers that are meaningful to them and interprets numbers in context;
- uses number and quantity words and associated language during play;
- uses counting to find out 'how many' there are;
- uses a number to describe accurately how many objects there are in a set, or as a label;
- demonstrates knowledge of the order of numbers;
- identifies sets that contain one object and sets that contain more than one object;
- records, using marks that they can interpret and explain;
- demonstrates understanding of one-to-one correspondence, for example, matching cups to saucers.

As children develop, many of the above skills and abilities remain important; children will continue to use them. Additionally, look out for how each child:

- uses mathematical skills and ideas in everyday contexts such as play and problem-solving;
- develops awareness of pattern in number names and counting sequences;
- uses mathematical language particularly about quantity, comparisons and differences;
- continues number sequences, using the pattern of the sequence;
- recognises and says an increasing range of numbers, using comparative language, such as 'more' or 'fewer', when comparing numbers of objects in sets;
- counts on or back from different start numbers;
- uses ordinal language, for example, 'first', 'second' and 'third';
- joins in a count from zero in twos, fives and tens;
- partitions and recombines groups of objects, describing the total number;
- recognises that the number of objects stays the same when a group is rearranged;
- recognises numbers of objects without counting;
- compares the quantities of objects in two sets;
- works out the number in a set when one or more object is added or removed;
- finds out the total or 'how many altogether' after two sets have been combined;
- suggests an estimate for a quantity of objects before counting them.

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Steps in learning

Introduction

This section of *Numbers and patterns: laying foundations in mathematics* provides a structure to help practitioners and teachers to plan an appropriate breadth of mathematical experiences and to be aware of potential difficulties and how they might be overcome.

This section includes:

- a chart outlining the learning focuses within the six phases of the two themes, Number words and numerals and Counting sets;
- a chart illustrating skills and potential difficulties which children commonly experience within each of the two themes, together with possible learning and teaching approaches;
- guidance on key models and images that can be used to support the development of children's skills in early number.

To support planning further, the learning focuses within the phases chart are illustrated within the 'Enabling environments' and 'Role of the adult' sections of this resource.

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Numbers and patterns phases

	Number words and numerals Children:	Counting sets Children:
Phase 1	• Use some number names and number language accurately • Offer comments or ask questions about numbers, demonstrating their curiosity • Say some number names in sequence • Show an awareness of numbers in their environment • Recognise and continue repeating patterns	• Show awareness of one-to-one correspondence through practical everyday experience • Distinguish between quantities, recognising when a group of objects is more than one • Begin to make comparisons between quantities • Use some number language, such as 'more' and 'a lot'
Phase 2	• Recognise some numbers of personal significance • Count forwards and backwards within the number sequence 1 to 5 • Order numbers in the range 1 to 5 • Recognise, say and identify numerals 1 to 5	• Appreciate that numbers can identify how many objects are in a set • Count up to five objects by touching each object and saying one number name for each item • Know that the last number in the count gives the total • Represent numbers up to five, using fingers • Recognise groups with one, two or three objects • Match groups with the same number of objects (one to three)
Phase 3	• Count forwards and backwards within the number sequence 1 to 10 • Recognise, say and identify numerals 1 to 9 • Order numbers in the range 1 to 9 • Say the number that comes after a given number within the number sequence 1 to 10	• Represent numbers up to ten, using fingers • Count reliably up to ten objects, including those that cannot be moved • Count actions or sounds • Count out a smaller number of objects (up to six) from a larger group • Match and compare the numbers of objects in two sets, recognising when the sets contain the same number of objects • Move around, or partition and recombine small groups of up to four objects, and recognise that the total is still the same

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	Number words and numerals Children:	Counting sets Children:
Phase 4	• Count forwards and backwards within the number sequence 1 to 20 • Order numbers across the 10 boundary (e.g. 8 to 11) • Use zero and the numeral to represent it • Recognise, say and identify numerals 0 to 9 and beyond • Say the numbers that come before and after a given number within the number sequence 1 to 20 • Recognise and continue patterns linked to number • Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts	• Count reliably any arrangement of up to ten objects • Instantly recognise, without counting, familiar patterns of up to six objects • Begin to estimate how many objects can be seen and check by counting (up to ten) • Find one more or one less than a number from 1 to 10 • Partition and recombine small groups of up to ten objects • Find the total number of objects in two groups by counting all of them • Introduce the empty set (0) • Recognise that the number of objects in a set does not change if they are moved around • Remove objects from a small group and count how many are left
Phase 5	• Count forwards and backwards within the number sequence 0 to 30 • Count forwards in twos, fives or tens • Recognise, say and identify numerals up to 30 • Say the numbers that come before and after a given number within the number sequence 0 to 30 • Identify and explain simple patterns in the number sequence • Use the language of ordinal numbers in a range of contexts	• Count reliably more than ten objects • Find the total by combining two groups, where one group is screened (seen and then hidden) and counting on • Compare sets of up to 20 objects, using language such as 'more' or 'fewer' • Estimate a number of objects that can be checked by counting • Instantly recognise, without counting, organised and random arrangements of small numbers of objects • Remove a smaller number from a larger and find how many are left by counting back from the larger number • Begin to find out how many have been removed from a larger group of objects by counting up from a number
Phase 6	• Count forwards and backwards within the number sequence 0 to 100 • Say the numbers that come before and after a given number within the number sequence 0 to 100 • Count forwards and backwards in twos, fives and tens • Recognise, say and identify numerals 0 to 100	• Relate addition to counting on and recognise that addition can be done in any order • Count large groups of objects by using efficient strategies • Understand subtraction as 'take away' and find a 'difference' by counting up

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Number words and numerals – skills and potential difficulties

Key skills within this theme include:

- knowing the number names in order;
- counting forwards and backwards in ones, twos, fives and tens;
- recognising and continuing number patterns;
- recognising, saying and identifying numbers;
- ordering numbers;
- knowing the number that comes before or after;
- using ordinal numbers.

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Number words and numerals			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Knowing the number names in order Counting forwards and backwards in ones, twos, fives and tens Recognising and continuing number patterns	**Phase 1** • Say some number names in sequence • Use some number names and number language accurately • Recognise and continue repeating patterns **Phase 2** • Count forwards and backwards within the number sequence 1 to 5 **Phase 3** • Count forwards and backwards within the number sequence 1 to 10 **Phase 4** • Count forwards and backwards within the number sequence 1 to 20 • Recognise and continue patterns linked to number	Doesn't separate the number names but says 'Onetwothreefour…' as if one word Misses out number names, e.g. one, two, three, five, six Repeats number names, e.g. one, two, two, three, four Uses the correct number names but in the wrong order, e.g. one, two, three, four, six, five Recites accurately the number names when starting from one or zero, but has difficulty counting from other starting numbers and when counting backwards Confuses the '-teen' and '-ty' words, e.g. eighteen, nineteen, twenteen… Says 'threeteen and fiveteen' for thirteen and fifteen Confuses two sequences, e.g. …ten, eleven, twelve, thirty, forty, fifty, sixty, seventy, eighty, ninety	Encourage children to rehearse number names and order using songs, games, books and rhymes Give children experience of counting from different starting points, both forwards and backwards Encourage children to count aloud in twos, fives and tens, supported by images and resources such as number lines, counters and arrays Encourage children to spot the mistakes a puppet makes when counting and to teach the puppet how to count correctly Ensure that children have frequent opportunities to cross tens boundaries in counting activities, rhymes and games Use a large number track on the floor, which children can jump along while counting forwards and backwards

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Number words and numerals			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
	Phase 5 • Count forwards and backwards within the number sequence 0 to 30 • Count forwards in twos, fives or tens • Identify and explain simple patterns in the number sequence **Phase 6** • Count forwards and backwards within the number sequence 0 to 100 • Count forwards and backwards in twos, fives and tens	Has difficulty crossing tens boundaries successfully when counting both forwards and backwards, e.g. twenty-seven, twenty-eight, twenty-nine, twenty-ten or twenty-two, twenty-one, twenty, ten … Confuses the vocabulary of counting 'backwards', 'forwards', 'up', 'down', 'on', 'back from', etc. and counts in the wrong direction	
Recognising, saying and identifying numbers	**Phase 1** • Show an awareness of numbers in their environment • Offer comments or ask questions about numbers, demonstrating their curiosity	Can recognise, say and select certain numbers that have personal meaning, but not others (e.g. recognise 4 because they have seen this label on their 4th birthday cards, but not 1, 2 or 3)	Use tactile numeral cards made from sandpaper, velvet or string Make number books that have meaning for the children, such as favourite numbers, birthdays or telephone numbers

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Number words and numerals			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
	Phase 2 • Recognise some numbers of personal significance • Recognise, say and identify numerals 1 to 5 **Phase 3** • Recognise, say and identify numerals 1 to 9 **Phase 4** • Recognise, say and identify numerals 0 to 9 and beyond • Use zero and the numeral to represent it **Phase 5** • Recognise, say and identify numerals up to 30 **Phase 6** • Recognise, say and identify numerals 0 to 100	Confuses some numerals, e.g. 2 and 5 Fails to recognise that there can be different styles for the same numeral, e.g. 4 and 1 Fails to recognise typed and handwritten versions of the same numeral Fails to recognise when numbers are represented by two digits, e.g. reads 14 as 'one four' rather than 'fourteen'	Extend number books to introduce new numbers, for example, the birthday of a puppet Make sure the environment contains numerals in different styles, both printed and written, by adults and children Link images with counting out loud, for example, pointing to each number on a number track or number line as it is said Display numbers written in numerals for a purpose, e.g. to show how many children can play in the water tray or work on the computer

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Number words and numerals			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Ordering numbers Knowing the number that comes before/after	**Phase 2** • Order numbers in the range 1 to 5 **Phase 3** • Order numbers in the range 1 to 9 • Say the number that comes after a given number within the number sequence 1 to 10 **Phase 4** • Order numbers across the 10 boundary (e.g. 8 to 11) • Say the numbers that come before and after a given number within the number sequence 1 to 20 **Phase 5** • Say the numbers that come before and after a given number within the number sequence 0 to 30 **Phase 6** • Say the numbers that come before and after a given number within the number sequence 0 to 100	Has to count from 1 to find the number before or after a given number as they are insecure when counting from other starting numbers Is unable to identify a missing number within a given range Confuses the number that comes before and after a given number, e.g. saying four comes before three rather than after three Confuses the language of ordering numbers, e.g. says 'six comes behind seven'	Give children experience of counting from different starting points, both forwards and backwards Provide children with partially completed number tracks, e.g. 1, □, □, □, 5 to give them experience of identifying which number goes before or after given numbers Provide images of objects, e.g. images of the spots on a dice, and ask children to order these and identify the image that comes before or after

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Number words and numerals			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Using ordinal numbers	**Phase 4** • Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts **Phase 5** • Use the language of ordinal numbers in a range of contexts	Confuses cardinal and ordinal numbers, e.g. confusing 'four' and 'fourth' Doesn't recognise the special cases, e.g. second, third	Show children how to use ordinal numbers in a variety of contexts, e.g. 'the blue car came fifth', 'the eighth animal to go into the ark is an elephant' Help children to understand the difference between 'how many…?' questions (cardinal) and 'what position?' questions (ordinal), e.g. 'how many children are there?' and 'who came third?'

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Counting sets – skills and potential difficulties

Key skills within this theme include:

- keeping track of the objects counted;
- recognising that the number associated with the last object touched is the total number of objects;
- counting things you cannot move, touch or see, or counting objects of very different sizes;
- knowing when to stop, when counting out a number of objects from a larger set;
- recognising small numbers of objects without counting them (subitising);
- making a reasonable estimate of a number of objects without counting;
- recognising that, if a group of objects already counted is rearranged, the total number stays the same (conservation of number);
- partitioning and recombining small groups of objects;
- comparing the size of quantities;
- recognising that if objects are added or removed, the number of objects changes (addition or subtraction);
- counting on or back to add or subtract.

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Counting sets			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Keeping track of the objects counted Counting things you cannot move, touch or see, or counting objects of very different sizes Knowing when to stop when counting out a number of objects from a larger set Recognising that the number associated with the last object touched is the total number of objects	**Phase 1** • Show awareness of one-to-one correspondence through practical everyday experience **Phase 2** • Count up to five objects by touching each object and saying one number name for each item • Represent numbers up to five, using fingers • Appreciate that numbers can identify how many objects are in a set • Know that the last number in the count gives the total **Phase 3** • Count reliably up to ten objects, including those that cannot be moved • Count actions or sounds • Count out a smaller number of objects (up to six) from a larger group • Represent numbers up to ten, using fingers	Does not coordinate number names with items being counted Coordinates number names with items counted but misses out one or more of the objects Coordinates number names with items counted but counts an object more than once Does not associate the number names said with the number of objects counted Does not realise that the last number in a count is the number in the set When asked for the total in a collection that they have just counted, counts the whole set again Loses track when counting objects that are randomly arranged, or that cannot be touched Loses track when counting sounds	Model touching each object once as you say a number Model counting objects systematically, e.g. point to one at a time from top to bottom, left to right When counting objects, discuss with the children what they could do to make counting easier, e.g. put them in a line, move them as we count Show children strategies for successful counting – move each object, touch each object, put the objects in a pattern Count things that can be seen but not touched, e.g. model pointing at paintings on the window to count how many there are Count sounds, e.g. drop coins into an empty tin at irregular intervals to encourage children to wait for each sound before it is counted; if children initially find this challenging, model keeping a tally or using fingers to count

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Counting sets			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
	Phase 4 • Count reliably any arrangement of up to ten objects **Phase 5** • Count reliably more than ten objects **Phase 6** • Count large groups of objects by using efficient strategies		Encourage children to count actions, e.g. count hand claps Discuss where to start when counting objects so that objects are not counted twice Include as many senses in the counting tasks as possible; include the child's movements, skipping, strides around the outdoor area, shouting out one number word for each step
Recognising small numbers of objects without counting them (subitising)	**Phase 2** • Recognise groups with one, two or three objects **Phase 4** • Instantly recognise, without counting, familiar patterns of up to six objects **Phase 5** • Instantly recognise, without counting, organised and random arrangements of small numbers of objects	Can only subitise when objects are arranged in familiar patterns Relies on counting small numbers of objects even when they recognise how many there are	Encourage instant recognition of one, two or three dots by providing dice and dominoes for the children to include in their play Put small numbers of objects in unfamiliar patterns and compare with familiar patterns, such as spots on dice and dominoes When children subitise correctly, accept their responses rather than insisting that they check by counting Encourage children to visualise common familiar patterns, e.g. looking closely at the arrangement of dots on a dice, talking about what they can see, then hiding the dice and asking the children to recreate the pattern

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Counting sets			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Making a reasonable estimate of a number of objects without counting	**Phase 4** • Begin to estimate how many objects can be seen and check by counting (up to ten) **Phase 5** • Estimate a number of objects that can be checked by counting	Believes that an estimate has to match the exact number of objects Makes wild estimates, e.g. using favourite large numbers	Make everyday examples of estimation used in all areas of learning explicit – 'do you think we've got enough cups?' Do not ask children to estimate objects that they can subitise or count very quickly Ask children to estimate mixed sets of objects, sounds (e.g. shake a tin containing coins) and objects they can't easily see (e.g. the number of objects in a pencil case) Model estimation strategies for children, e.g. 'do you think there are more or fewer than ten?'; ensure they have opportunity to build on experience, for example, collecting sets of ten objects and using these as a benchmark when making other estimates
Recognising that if a group of objects already counted is rearranged, the total number stays the same (conservation of number) Partitioning and recombining small groups of objects	**Phase 3** • Move around, or partition and recombine small groups of up to four objects, and recognise that the total is still the same	Recounts a group of objects when they are repositioned Thinks that there are more or fewer objects than they started with when they are split into two groups or recombined	Give children plenty of experience of finding for themselves that the total number of objects stays the same Ensure children have experience of finding out whether the number of objects has stayed the same when another child or puppet has moved them, as well as moving the objects themselves

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Counting sets			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
	Phase 4 • Recognise that the number of objects in a set does not change if they are moved around • Partition and recombine small groups of up to ten objects	Understands conservation of number for a small number of objects, but thinks that the total changes when a larger number is moved, partitioned or recombined	Continue to check that children understand conservation when the number of objects they are interacting with increases
Comparing the size of quantities	**Phase 1** • Begin to make comparisons between quantities • Use some number language, such as 'more' and 'a lot' • Distinguish between quantities, recognising when a group of objects is more than one **Phase 2** • Match groups with the same number of objects (one to three) **Phase 3** • Match and compare the number of objects in two sets, recognising when the sets contain the same number of objects **Phase 5** • Compare sets of up to 20 objects using language such as 'more' or 'fewer'	Refers to any number of objects more than one as 'lots' Assumes that the amount of space taken up by a group of objects relates to the overall quantity, e.g. thinks that a row of five large objects is more than a row of eight small objects Fails to recognise that a group of four apples contains the same number as a group of four peas Is insecure with the language of comparison, e.g. can say 'Pradeep has more shells than Jo' when Pradeep had five and Jo has three, but not 'Jo has fewer than Pradeep'	Ensure that children have frequent opportunities to compare sets of objects of different sizes Give children strategies for comparing the number of objects in different groups, e.g. pairing objects from each set Model the language of comparison and ensure children are asked to identify who has fewer as well as who has more and encourage children to use the corresponding language

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Counting sets			
Skills	**Numbers and patterns phase**	**Potential difficulties**	**Learning and teaching approaches**
Recognising that if objects are added or removed, the number of objects changes (addition or subtraction) Counting on or back to add and subtract	**Phase 4** • Find one more or one less than a number from 1 to 10 • Find the total number of objects in two groups by counting all of them • Remove objects from a small group and count how many are left **Phase 5** • Find the total by combining two groups, where one group is screened (seen and then hidden) and counting on • Remove a smaller number from a larger and find how many are left by counting back from the larger number • Begin to find out how many have been removed from a larger group of objects by counting up from a number **Phase 6** • Relate addition to counting on and recognise that addition can be done in any order • Understand subtraction as 'take away' and find a 'difference' by counting up	When counting on or back from a given number, includes the given number in their counting Can count on but does not understand how to apply this to addition or the combining of two or more groups of objects, resorting to counting all Counts on or back in ones but does not use this to add or subtract Associates counting on with addition but not as a way of finding the difference between two numbers that are close together	Encourage children to move beyond counting all objects by covering up one group of objects and asking them to count on from this number Get children physically to jump forwards and backwards along number tracks and lines Ask children to count the number of jumps they need to make to get from one number to another on a number track or line

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Models and images

Number tracks and number lines

Number tracks and number lines are models and images that are frequently used to represent the number system. They can be used to support the activities throughout *Numbers and patterns: laying foundations in mathematics*. It is important that practitioners and teachers provide a range of appropriate number tracks and lines, at child height, throughout the indoor and outdoor learning environment, and regularly model their use with children. If a number track or number line is difficult to see, not accessible to the children or not referred to it can quickly become just 'part of the wallpaper'.

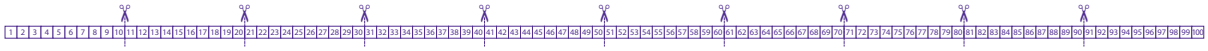
There is a difference between number tracks and number lines.

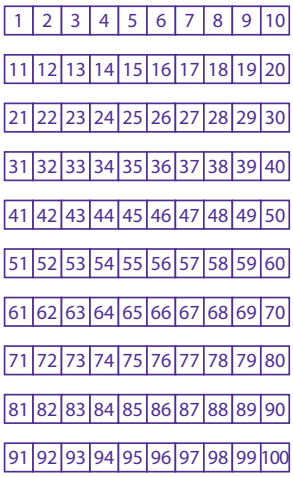
In a number track, each number occupies a cell and identifies or numbers that cell. The numbers should start at 1 (not at 0) and each number may have a matching illustration. Number tracks can be used to support the reading of numerals and locating ordered numbers.

1	2	3	4	5	6	7	8	9	10

1		?		5	?	7		?	10

When children start to encounter and use a hundred grid, help them to understand and see that it is a number track that has been cut up and reorganised into rows of tens.





1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

In a number line, the divisions rather than the spaces are numbered. This means they can begin at any number, they can show any number sequence and ultimately they can be expanded 'backwards' into negative numbers or enlarged to show decimal numbers and fractions. They allow the continuous nature of number to be represented and encourage children to count in steps.

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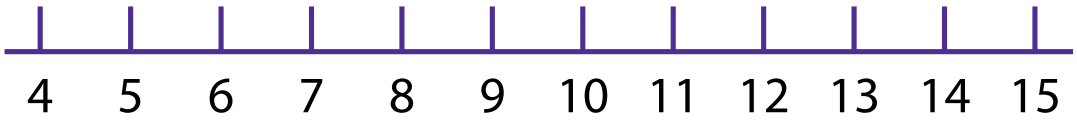
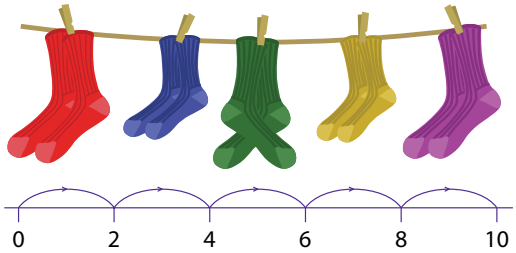
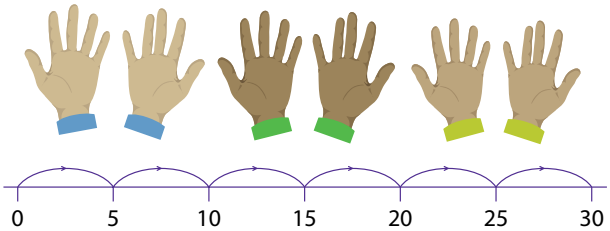
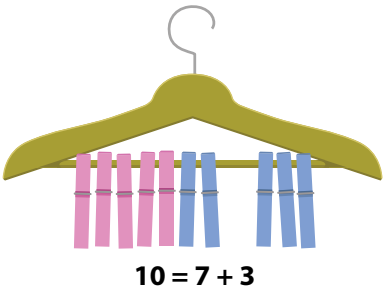
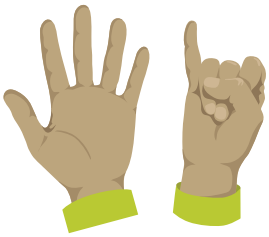


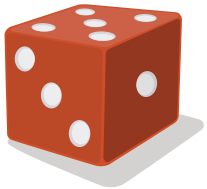




Other resources, models and images







5 in the bag and 3 more

Suggested models and images such as those above can be found on the following six models and images charts. These can be accessed via the National Strategies website at **www.standards.dcsf.gov.uk/nationalstrategies**.

• Models and images for counting on and back in ones and tens	• Models and images for partitioning and recombining
• Models and images for ordering numbers to 100	• Models and images for multiplication and division
• Models and images for addition and subtraction	• Models and images for addition and subtraction facts

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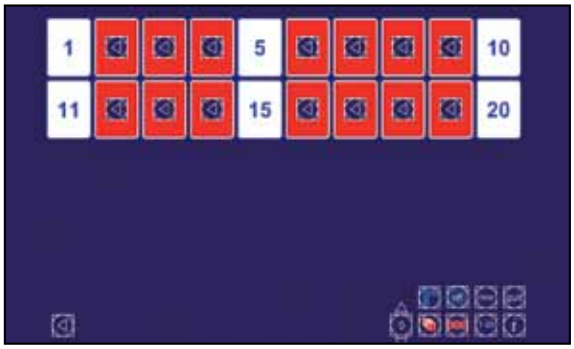
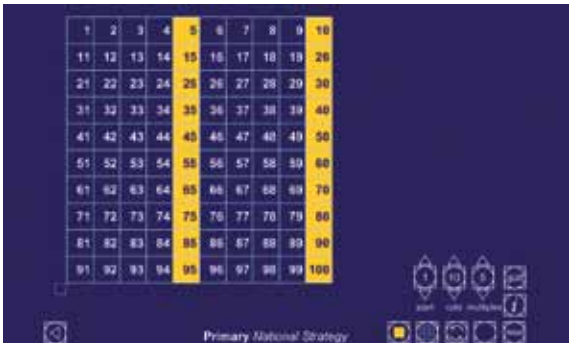
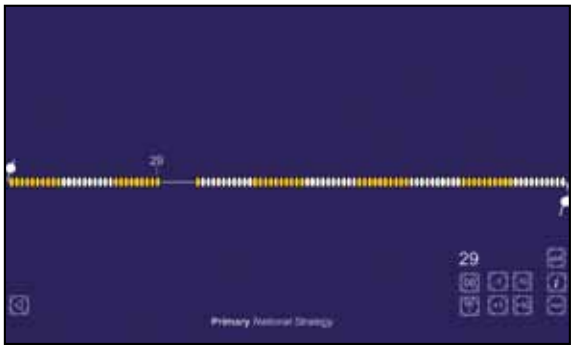
Interactive teaching programs

The interactive teaching programs (ITPs) have been developed to provide simple, ICT-based images that can be explored and manipulated by adults and children. Programs such as *Twenty cards ITP*, *Number grid ITP* and *Counting on and back ITP* provide opportunities to explore and discuss ordering numbers, recognising numbers and numerals and matching them to number names, counting forwards and backwards and finding the numbers before and after a number in a given range. Programs such as *Counting ITP*, *Number facts ITP* and *Difference ITP* provide opportunities to explore and discuss counting, comparing and matching sets, subitising and estimating, conservation of numbers and early addition and subtraction.

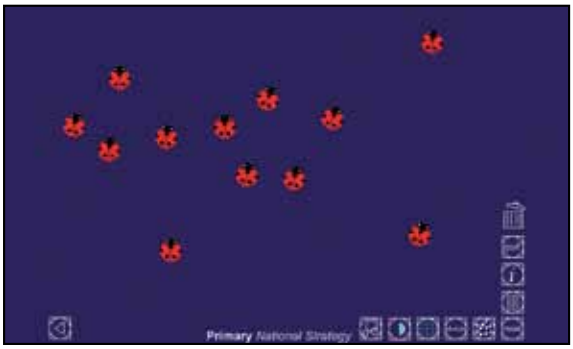


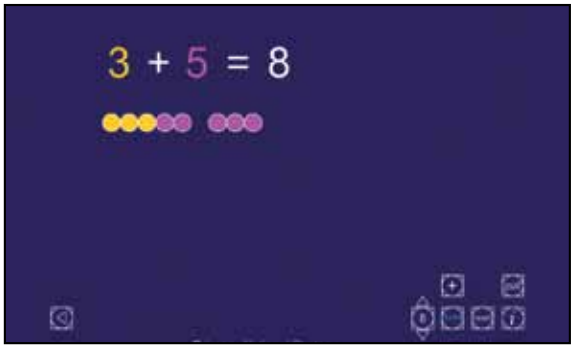
Twenty cards ITP


Number grid ITP



Counting on and back ITP


Counting ITP



Number facts ITP

Difference ITP

The ITPs can be accessed via the National Strategies website at **www.standards.dcsf.gov.uk/nationalstrategies**.

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Enabling environments

Introduction

This section of *Numbers and patterns: laying foundations in mathematics* comprises 12 cards. Each of them illustrates some potential opportunities for enhancing day-to-day provision for mathematical development through the use of everyday contexts and resources.

The 12 cards focus on the following contexts:

- construction
- daily routines
- large play
- malleable
- mark making
- role-play
- sand
- small world
- sound patterns
- table games
- visual patterns
- water play

Each card follows the same format.

Supporting learning	Context	Resources and suggested activities
Suggested adult interactions, involvement in children's play and questioning that encourages the development of language and reasoning Example prompts and discussion points to draw out the mathematical opportunities created by different situations	**Illustrated learning outcomes** Some of the learning focuses from the phases that could be developed within this context **Look, listen and note:** Support for observing children's mathematical development against the illustrated learning outcomes	Examples of resources and how these might be used to maximise opportunities for mathematical learning within this area

The enabling environments cards are designed to illustrate specific learning outcomes from the numbers and patterns phases. On any one card, only some of the learning focuses have been exemplified. This does not imply that these are the only focuses that could be addressed within that particular context.

The cards illustrate mathematical learning that relates to number words, numerals and counting sets. These contexts can also provide opportunities to develop wider aspects of mathematics such as shape, space and measures.

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Construction

Illustrated learning outcomes

- Recognise and continue repeating patterns (NWN Phase 1)
- Count out a smaller number of objects (up to six) from a larger group (CS Phase 3)
- Compare sets of up to 20 objects, using language such as 'more' or 'fewer' (CS Phase 5)
- Estimate a number of objects that can be checked by counting (CS Phase 5)
- Count large groups of objects by using efficient strategies (CS Phase 6)
- Understand subtraction as 'take away' and find a 'difference' by counting up (CS Phase 6)

Look, listen and note:

- how children describe their models, including any patterns within them
- strategies children use to count items accurately
- whether children make sensible estimates based on previous experience or reasoning
- how children compare, e.g. two towers of different heights and whether they are able to find the 'difference'

Resources and suggested activities

- Blocks of different shapes and sizes, including some with numbers on
- Assorted construction equipment such as:

crates	planks	balls
boxes	tubes	wheels
dowelling	tiles	play mats

- Additional craft materials such as:

card	string	tape

- A variety of commercial construction kits

Look for opportunities to use the visual images provided by models, such as towers, to encourage children to make direct comparisons,for example:

- encourage children to make similar models;
- ask children to discuss what is the same and what is different about their models, encouraging them to move the models next to each other, where possible, to compare them;
- talk about which model contains more or fewer items, how many more or fewer and how to check their ideas.

- Provide mark-making equipment for children to use, to incorporate words and numbers as labels into their models. Include: pens, paper, sticky tack, number cards, plastic or wooden numerals. Assemble them in carpenters' aprons.

Supporting learning

Observe children as they engage in construction. Model mathematical language by commenting on and questioning children about how they select and arrange objects.

- *I would like to make a train with five carriages. Can you choose blocks to use from this pile?*
- *I think you have put the blocks in a special pattern. You have put a red one, then a yellow one, then a red one again. What are you going to put next?*

Encourage children to describe their choices and explain their reasoning.

- *You have used the big blocks on the bottom of your castle. Did you do that for a reason?*
- *Where is the road you are making going to? How many more tiles do you think you will need? Do you think there are enough?*

Use prompts and questions to support children in making direct comparisons.

- *Which tower is taller now? How many blocks do you think you would have to add to yours, Vicky, to make it the same size as Evie's?*
- *You have both used tiles to make long roads. I wonder how many more tiles are in Sam's than Jake's. How could we find out?*

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Supporting learning

Observe how children respond to numbers in the environment. Ask questions that encourage children to problem solve and talk about how they use numbers.

- *How many children can paint around this table? How can we find out?*
- *Which number is on your painting overall? Which peg does it go on?*

Model the language of one-to-one correspondence and encourage children to explain how they are distributing objects.

- *We each need a counter for the game. Here is one for Emma, one for Josh... Sam, please can you give everyone else a counter?*

During routines such as coming to café time, develop the language of ordinal numbers and encourage children to use it.

- *Ali was first to come and sit down for a drink. Ali, who came after you and came second?*

Demonstrate how counting helps you with organisation, e.g. when taking the register.

- *There are 24 children when we are all here. Three are away today. Count back with me to find how many children are here: 23, 22, 21 (counting on fingers). We think that there are 21 children here. How could we check?*

Daily routines

Illustrated learning outcomes

- Show awareness of one-to-one correspondence through practical everyday experience (CS Phase 1)
- Recognise, say and identify numerals 0 to 9 and beyond (NWN Phase 4)
- Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts (NWN Phase 4)
- Count forwards and backwards within the number sequence 0 to 30 (NWN Phase 5)
- Understand subtraction as 'take away' and find a 'difference' by counting up (CS Phase 6)

Look, listen and note:

- situations in which children demonstrate understanding of one-to-one correspondence
- whether children recognise and respond appropriately to numbers and numerals as labels
- children's use of ordinal language in appropriate contexts
- strategies children use to count accurately in different contexts
- how children work out how many people or items are left when some are missing

Resources and suggested activities

Display number signs and labels to help organise key equipment and areas, such as:

- numbered bikes and parking spaces
- numbered painting overalls and pegs

Involve children in distributing and organising items, for example:

- snacks at snack time
- equipment for games

Make and use displays to support and secure everyday routines, for example:

- update a display of the date every day
- devise a self-registration system

Engage children in everyday organisational activities where possible, for example, using self-registration. To do this:

- make a display showing a picture of the setting and a picture of a house;
- take photos of each child;
- encourage children to move their own photo from the 'home' area to the 'school' area as they arrive each morning;
- use the display to discuss, for example, counting how many children are present each day.

- Make sure mathematical resources such as clocks and number tracks are readily available; demonstrate using them at appropriate times.

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Supporting learning

Note where children make spontaneous use of numbers as part of their play. Use mathematical language to describe their actions and encourage them to respond.

- *You did lots of skips then. Do you think that was more or less than last time?*
- *You are jumping from one number to another on the track. What number are you going to jump on next?*

Where appropriate, encourage children to count and estimate sets of objects. Use prompts and questions.

- *How many conkers are you rolling down the guttering? Do you think some will roll into the hoop? How many?*
- *I like the way you are filling up the tyre with balls. How many balls do you think are in there? How could you check?*
- *How many skittles do you think you knocked over that time? How could you check? How many does that leave still standing?*

Look for opportunities, such as games or races, to model the language of ordinal numbers. Use prompts and questions to engage children in discussion.

- *Yes, Amir, you were first in the race. Who came second and who came third?*
- *You have parked the cars in a line. Which car is first in the line? Can you tell me where the other cars are in the line?*

Large play

Illustrated learning outcomes

- Show an awareness of numbers in their environment (NWN Phase 1)
- Count reliably up to ten objects, including those that cannot be moved (CS Phase 3)
- Recognise, say and identify numerals 0 to 9 and beyond (NWN Phase 4)
- Begin to estimate how many objects can be seen and check by counting (up to ten) (CS Phase 4)
- Remove objects from a small group and count how many are left (CS Phase 4)
- Use the language of ordinal numbers in a range of contexts (NWN Phase 5)

Look, listen and note:

- the number language that children use spontaneously
- contexts in which children recognise and respond appropriately to numbers and numerals
- whether children use prior experience to help them make sensible estimates
- strategies children use to count accurately in different contexts
- how children work out how many objects are left when some are removed
- children's use of ordinal numbers

Resources and suggested activities

- A variety of large and small equipment, including:

bikes	cars	barrels	goals
crates	tyres	slides	beams
tunnels	cones	sticks	guttering
buckets	hoops	skittles	balls
beanbags	ropes		

- Permanent and temporary markings, such as:

tracks	grids	parking bays

Use numbers to label popular items such as bikes. This helps children to understand one of the key roles of numbers and helps them to recognise and match numbers and numerals, particularly if numbered parking spaces are provided. For example:

- ask questions such as: *Which is your favourite bike? Megan wants to use a bike. Which bikes are free?;*
- encourage children to park their bike on the appropriate parking space when they have finished with it.

- Ensure that numbers are evident in the indoor and outdoor environment in a range of forms, including number tracks, labels and markings such as hopscotch or number snakes.
- Provide mathematical equipment that children can choose to incorporate into large play, e.g. large dice, timers and floor number tiles.
- Make mark-making equipment, such as flipcharts and chalk, available at all times.

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Supporting learning

Work alongside children. Use description and questions to promote the use of number language, comparison and counting.

- *You have made lots of snakes. Which do you think is the longest? How can we check?*
- *Do we have enough raisins to put two on each biscuit? How could we check?*

Suggest and scaffold activities that involve children in looking closely at the shape of numerals and using malleable materials to make their own.

- *Which number cutter will you use to make a biscuit that shows your age? Does this number have straight lines, curved lines or both?*
- *You have made a long roll of plasticine. Show me how we can turn it into the number 3?*

Explore different ways of partitioning given numbers by encouraging children to try alternative ways of organising small objects or models.

- *There are ten raisins here. How many are you going to put on your biscuit? How many will that leave on the plate? What if you chose a different number?*
- *There are five candles. How could you put these on the two cakes? Are there different ways you could do this?*

Malleable

Illustrated learning outcomes

- Use some number language, such as 'more' and 'a lot' (CS Phase 1)
- Count reliably up to ten objects, including those that cannot be moved (CS Phase 3)
- Match and compare the number of objects in two sets, recognising when the sets contain the same number of objects (CS Phase 3)
- Recognise, say and identify numerals 0 to 9 and beyond (NWN Phase 4)
- Partition and recombine small groups of up to ten objects (CS Phase 4)

Look, listen and note:

- the number language that children use spontaneously
- which numerals children can recognise and recreate, using malleable materials
- the strategies children use to count objects accurately, including those they cannot move
- the language and strategies children use to compare the number of objects in two sets
- how children explore and describe different ways of arranging a number of objects into two sets

Resources and suggested activities

- A variety of malleable materials, such as:

  dough clay plasticine
- Assorted modelling tools, including:

  rollers knives cutters
- Containers, for example:

  egg boxes cake tins bowls
- Small items to incorporate, such as:

  raisins buttons pipe cleaners

Food technology provides an ideal medium for scaffolding discussion and exploration of number and quantity, for example:

- invite children to make biscuits;
- make biscuit dough together and encourage each child to roll some out;
- invite children to choose a cutter and to say how many biscuits they think they can cut out of their dough;
- use prompts and questions such as: *How many biscuits have you made so far? That's one more, so how many now? You need a cherry for each biscuit. Can you count them out?*

- Ensure that children have access to numerals, for example, providing numeral cutters, labels and number tracks.
- Over time, provide children with a variety of stimuli for modelling, such as stories, pictures and photographs.

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Supporting learning

Observe how children respond to numerals in the environment. Ask questions that encourage children to recognise and discuss contexts in which numbers are useful.

- *There is a number 4 next to our sand tray. What does that tell us?*
- *How do we know when it is time to go home? What do we look at to check that it is the right time?*

Model the language and recording of one-to-one correspondence, for example, making a mark for everyone who is present when taking the register.

- *Look at our photos on the register board. How does this help us to know how many children are here today?*
- *This list is going to help us to know who has brought back their letter for our trip. When you give me your letter, we will put a tick next to your name.*

Draw children's attention to instances when you record pictures, tallies or numbers to keep track of a count. Use prompts and questions to encourage children to mark-make in appropriate situations.

- *Put up your hand if you need a lunch today. Mrs Jones needs to know this. What could we do to let her know?*
- *How many skittles did you knock down that time? What could you do to help you remember your score? What will you use?*

Mark-making

Illustrated learning outcomes

- Show awareness of one-to-one correspondence through practical everyday experience (CS Phase 1)
- Appreciate that numbers can identify how many objects are in a set (CS Phase 2)
- Know that the last number in the count gives the total (CS Phase 2)
- Recognise, say and identify numerals 0 to 9 and beyond (NWN Phase 4)
- Count forwards and backwards within the number sequence 1 to 10 (NWN Phase 3)
- Count actions or sounds (CS Phase 3)

Look, listen and note:

- situations in which children use one-to-one correspondence to support counting
- how children demonstrate their understanding that counting can tell us how many objects are in a set
- how children respond to or create numbers as labels
- contexts in which children make marks or use resources to represent numbers
- which numerals children recognise, identify or represent

Resources and suggested activities

- Display equipment and information to show how numbers support and secure everyday routines, such as:

  clocks coat pegs calendars

  labels for equipment such as bikes

  self-registration display

- Provide appropriate resources within the role-play area that children can choose to use:

  calculators forms notebooks

  money phones telephone book

Model how recording numbers is useful within role-play contexts, for example:

- join in a garage role-play by taking on the role of a customer;
- read items from a repairs list;
- ask the mechanic to help you to find and count out some of the items you require;
- refer to the price list;
- provide lists, paper and pencils so that children may choose to create their own repair list and bills.

- Provide appropriate and appealing mark-making equipment in every area, for example, pens and paper, whiteboards, flipcharts, notebooks or chalk.
- Provide children with resources they can draw on to record numbers. Include number tracks, number cards, labels and number stamps.

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Role-play

Illustrated learning outcomes

- Show an awareness of numbers in their environment (NWN Phase 1)
- Use some number names and number language accurately (NWN Phase 1)
- Appreciate that numbers can identify how many objects are in a set (CS Phase 2)
- Count up to five objects by touching each object and saying one number name for each item (CS Phase 2)
- Know that the last number in the count gives the total (CS Phase 2)
- Recognise, say and identify numerals 1 to 9 (NWN Phase 3)

Look, listen and note:

- the number language that children use spontaneously
- instances where children choose to count objects to find how many there are in a set and the strategies they use to do this accurately
- the numerals from 1 to 9 that children recognise and refer to in their play

Supporting learning

Where appropriate, take on a suitable role and engage in role-play alongside the children. In role, use comments and prompts to develop awareness of examples of numbers in everyday contexts.

- *I need some stamps, please, one for each of these letters. How much does each stamp cost?*
- *I want to watch my favourite TV programme. Have I got time before dinner? What time is it now?*

Model appropriate language and strategies in role-play where counting forms a useful everyday tool.

- *How many sausages do you want for your dinner? I would like two. I wonder if we have enough... One, two for me and one, two (pointing) for you. We have one left over.*
- *Can you lay the table? There are four of us eating. Here are four forks...one, two, three, four (counting out onto table). Can you get the knives and spoons ready?*

Refer to examples of numerals in the role-play environment and encourage children to use equipment that involves number:

- *My favourite TV programme is on Channel 4. Can you use the remote to change to the right channel?*
- *Jack's phone number is 837465. Can you phone him to check what time he will be home for dinner?*

Resources and suggested activities

- Play equipment for everyday items, such as:

cups	cutlery	foodstuff
clothing	bags	magazines

- Everyday equipment that involves numbers, including:

clock	calendar	calculator
telephone	timers	remote control
scales	till	money

Interact with the children, in role, to draw out instances where number and counting play an important part in everyday life, such as, when shopping, for example:

- demonstrate how reading a shopping list can help you to remember what you need to buy;
- model how to count out, for example, five apples by moving them one at a time into your basket as you count;
- encourage the assistant to help you to count out other items on your list.

- Provide examples of numbers or lists, as appropriate to the setting, for example, price lists in a shop or a TV guide and house numbers for houses.
- Ensure that children have access to mark-making equipment, including notebooks and a memo board.

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Sand

Illustrated learning outcomes

- Begin to make comparisons between quantities (CS Phase 1)
- Recognise, say and identify numerals 1 to 9 (NWN Phase 3)
- Count reliably any arrangement of up to ten objects (CS Phase 4)
- Begin to find out how many have been removed from a larger group of objects by counting up from a number (CS Phase 5)
- Relate addition to counting on and recognise that addition can be done in any order (CS Phase 6)

Look, listen and note:

- how children organise, count and compare sets of objects that they find hidden in the sand
- how children describe and identify numerals found in the sand
- how children try to predict how many objects are still hidden if the total number of hidden objects is known
- whether children keep track of how many objects they have found altogether by counting on

Resources and suggested activities

- Containers of different shapes and sizes, such as:

  jugs cups measuring jugs buckets
- Objects for children to order or make patterns, including:

  numbered flags dominoes

  sticks shape tiles
- Objects to hide in the sand:

  natural objects, such as shells, conkers, pebbles...

  manufactured objects, such as large numerals, counters, coins...

Scaffold 'treasure hunt' activities to model and promote the use of number language, for example:

- ask children to hide a specific number of objects;
- discuss what children have found;
- encourage them to sort and count objects found;
- ask children to find the total number of objects found so far;
- encourage children to predict how many objects are still left to find. Model how to check by counting up.

- Place a number track by the sand tray to support children's counting.
- Make paper and pens available to allow children to choose to mark-make.

Supporting learning

Encourage children to describe patterns or numbers they have created in the sand.

- *You have used the sticks to make the number 4 in the sand. Could you make the number 8? Why not? What are you going to do next?*
- *Describe the pattern you have made with the stones. How many stones are there in your pattern?*

Use prompts and questions that encourage children to organise, count and compare objects and containers.

- *Tell me what you have found so far. How have you organised the objects?*
- *Have you found more conkers or marbles? How can you be sure?*
- *How many bowls of sand do you think you would need to fill the bucket?*
- *How many handprints do you think you can fit in the sand tray?*

Model the language of addition and subtraction and encourage children to find totals and predict how many objects are still hidden.

- *You have found five shells and three plastic fish. How many objects have you found altogether? Show me how you know.*
- *Ten stars were hidden. How many have you found so far? Try to work out how many are still hidden.*

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Supporting learning

Observe children's play. Where appropriate, join in with their chosen context to engage them in selecting and counting objects.

- *I can see that it is feeding time. How many animals does the farmer need to feed?*
- *You have lots of cars to fix today. How many people are working in the garage? Do you think that will be enough?*

As children reorganise models during their play, use prompts to encourage them to describe how the set has been distributed.

- *I am going to put the animals into different enclosures. Can you help me decide how to do this?*
- *Can you tell me how many animals you have altogether? How many are in each field? If we put all the animals into one field, how many would there be then?*

Model the use of mathematical language to compare two sets. Ask questions to engage the children in comparison.

- *Do you have more cows or more horses on the farm? How could you check?*
- *I wonder if there are enough spaces in the car park for all of the cars. How could we find out?*
- *How many cups have you put on the table? Are there more saucers or more cups? How do you know?*

Small world

Illustrated learning outcomes

- Show awareness of one-to-one correspondence through practical everyday experience (CS Phase 1)
- Match and compare the numbers of objects in two sets, recognising when the sets contain the same number of objects (CS Phase 3)
- Recognise that the number of objects in a set does not change if they are moved around (CS Phase 4)
- Count reliably any arrangement of up to ten objects (CS Phase 4)
- Partition and recombine small groups of up to 10 objects (CS Phase 4)

Look, listen and note:

- instances where children use one-to-one correspondence to match items, such as when laying a table for a toys' tea-party
- strategies used to count the number of items in a set accurately
- the language children use to compare the numbers of objects in two sets
- situations where children split a set of objects, whether they can describe the arrangement and appreciate that the total remains the same

Resources and suggested activities

- Equipment to represent settings such as:

  garages farms zoos

  dolls' house vehicles play mats
- Models, including:

  model people and animals

  dolls toys puppets
- Sets of appropriate items to use within contexts:

  cups plates cutlery

  play food party hats

Model and encourage children to use the language of one-to-one correspondence in appropriate contexts, for example:

- invite children to choose toys to come to the toys' tea-party;
- model how to use the language of one-to-one correspondence to put out plates – *one plate for teddy, one for rabbit...*
- ask children to lay the table. Use prompts such as: *There are five guests, so are there enough cups? How do you know?*

- Make number cards available so that children can choose to use numbers as labels within small-world play.
- Provide equipment related to known number rhymes and stories so that children may choose to draw on these stories and rhymes in their play.

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Sound patterns

Illustrated learning outcomes

- Use some number language, such as 'more' and 'a lot' (CS Phase 1)
- Recognise and continue repeating patterns (NWN Phase 1)
- Count forwards and backwards within the number sequence 1 to 10 (NWN Phase 3)
- Represent numbers up to ten, using fingers (CS Phase 3)
- Count actions or sounds (CS Phase 3)
- Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts (NWN Phase 4)

Look, listen and note:

- the number language that children use spontaneously
- how children recognise and describe a sequence of sounds that is repeated several times
- whether children count sounds using their fingers to keep track of the count or by counting on in their head
- how children follow instructions that use the words 'first', 'second' and 'third' to create a musical sequence and whether they can use these words to describe a sequence of their own design

Supporting learning

As children listen to or create sounds, encourage them to use some number language to describe it.

- *You have chosen lots of instruments to play. Which one are you going to play first?*
- *I am going to make a pattern using three instruments and then keep playing the same pattern over and over again. Can you listen and copy my pattern? Can you make a pattern of your own?*

Scaffold activities to help children acquire and rehearse strategies to count sounds.

- *I am going to put up a finger each time Laurence beats the drum. Look at my fingers – how many times did Laurence beat the drum? Can you join in, using your fingers this time?*
- *Nod your head every time you hear a sound and keep a silent count in your head. How many sounds did you hear?*

Play a sequence of sounds for children to listen to. Model how to use ordinal numbers to describe the sequence. Prompt children to use ordinal language to describe the sequence.

- *Close your eyes. I am going to make three sounds. Which instruments do you think I used first?... second?...third?*
- *What is the first sound you are going to make? What are you going to play second?*

Resources and suggested activities

- Equipment to play and record sounds such as a CD player and a tape recorder.
- A variety of commercial equipment, such as:

  drum triangle clicker whistle
- Home-made instruments and resources to make sounds, such as:

  beans plastic pots elastic bands

Encourage children to explore how changing the quantity and types of materials used alters the sounds, for example:

- invite children to choose a container to make a shaker;
- ask them to count ten small objects to put into their shaker and to listen to the sound;
- encourage them to predict how the sound will change if you place only five of the objects in the shaker;
- test out their ideas.

- Provide recordings, including number songs, rhymes and stories, so that children can listen and join in. Encourage children to compose music to accompany the recordings.
- Make equipment available for children to make notes to support their activities. Include whiteboards and pens, a laminated number track or grid.

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Table games

Illustrated learning outcomes

- Recognise, say and identify numerals 1 to 9 (NWN Phase 3)
- Instantly recognise, without counting, familiar patterns of up to six objects (CS Phase 4)
- Count reliably any arrangement of up to 10 objects (CS Phase 4)
- Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts (NWN Phase 4)
- Remove a smaller number from a larger and find how many are left by counting back from the larger number (CS Phase 5)
- Relate addition to counting on and recognise that addition can be done in any order (CS Phase 6)

Look, listen and note:

- how children count and compare sets
- which numerals children can identify
- whether children recognise familiar patterns of one to six objects or count them
- how children use the ordinal language 'first', 'second' and 'third'
- whether children can use counting on or back to add or subtract objects

Resources and suggested activities

- Appealing objects and containers, such as:

  shells beads bowls gift boxes
- Include containers with lids to encourage children to visualise objects.
- Commercial games, such as:

  board games dominoes

  matching games such as 'lotto'

  'collection' games e.g. magnetic fishing
- Flexible number resources that can be adapted to use in different games and activities:

  dice spinners playing cards coloured counters

  cards showing sets of objects or dots

Play dice and board games alongside children so that you can model mathematical language and encourage children to describe their actions, for example:

- There is a dot in each corner of the dice, so I have thrown a 4. What have you thrown?
- You have thrown a 2. Can you predict where you are going to land?
- What number do you want to throw this time? Why?
- How many more do you need to finish first? How do you know?

- Provide equipment to help children keep track of totals, e.g. whiteboards and pens, number cards and tracks.

Supporting learning

Encourage children to count and compare sets of objects and to recognise common patterns of objects.

- *How many fish did you catch on your first go? What about your second go? Was this more or fewer?*
- *The dice has a dot in each corner and one in the middle. Do you know how many dots this is?*

Use prompts and questions to help children recognise numerals and use them to label sets of objects.

- *Is the number on this card made using straight lines or curves or both?*
- *How many fish have you collected so far? Can you find the card that shows this number? How did you recognise it?*

Model the language of addition and subtraction, prompting children to count on or back rather than counting every object.

- *You are on square 5 and have just thrown a 3 with the dice. How will you work out where you are going to land?*
- *I already have six objects and I have won another four. Count with me as I add them to my bowl: six already, so this makes seven, eight, nine, ten. I have ten objects now.*
- *Ryan has nine counters, but he has to give Daniel three. Let's count back together as he hands them over: That's eight, seven, six (using fingers). So Ryan has six left.*

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Supporting learning

Use descriptions and prompts to promote dialogue with children about the choices they are making.

- *You have painted three animals so far. What are you going to do next?*
- *You have used lots of circles in your picture. How many? How have you organised them?*

Engage in activity alongside children, so that you can model how to describe patterns and encourage them to discuss the patterns in their work.

- I am putting the beads onto my string in a pattern: one red bead, one yellow bead then one green bead. One red bead, one yellow bead... What do you think will come next?
- I like the pattern you are making with the stamps. Can you describe it to me?

Use a range of examples as a basis for discussion about numbers, including focus on estimation and partitioning.

- *Which of our pictures do you think has most bugs in it? How could we check?*
- *Amy and Sam are showing us their necklaces. Amy's necklace has eight beads on it. How many beads do you think are on Sam's? How could we check?*
- *We all put ten spots on our ladybirds. How many different ways did we find to do this?*

Visual patterns

Illustrated learning outcomes

- Recognise and continue repeating patterns (NWN Phase 1)
- Recognise that the number of objects in a set does not change if they are moved around (CS Phase 4)
- Count reliably any arrangement of up to ten objects (CS Phase 4)
- Partition and recombine small groups of up to ten objects (CS Phase 4)
- Estimate a number of objects that can be checked by counting (CS Phase 5)

Look, listen and note:

- how children describe what they are making, including patterns in their work
- how children select and count items to include in their work
- how children explore positioning a set of objects in different ways and whether they appreciate that the total number of objects remains the same wherever they are placed
- whether children use previous experience and reasoning to make sensible estimates

Resources and suggested activities

- General practical materials including:

  paint cloth wool

  papers crayons pencils
- Small items such as:

  beads sequins stickers

  stamps paper shapes
- Structured materials to support pattern-making:

  pegboards beads and laces squared paper
- A variety of commercial construction kits

Use appropriate contexts to explore different ways of partitioning a number, for example:

- invite children to work together to create a group or class display;
- ask each child to count a given number of objects, such as ten spots for their ladybird;
- encourage children to work together so that everyone has a different way of organising their ten spots onto the two sections of their ladybird;
- discuss the different examples.

- Make plastic or wooden numbers and number cards available for children to incorporate into or label their work.
- Within displays, use numbers and mathematical questions such as: *Our ladybirds each have ten spots. How many different ladybirds can you see?*

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Supporting learning

Encourage children to close their eyes and count while you drop pebbles one by one into the water.

- *How many pebbles do you think I dropped into the water?*
- *Can you check by finding all the pebbles?*

Use prompts and questions to encourage children to count objects and actions.

- *You have put lots of people into your boat. I wonder how many people will fit in before it sinks. Shall we find out?*
- *You are pouring jugs of water into this pot. How many jugfuls have you poured in so far? Count on to find how many jugfuls it takes to fill the pot.*

Scaffold activities to allow you to model and promote the use of reasoning to support estimation.

- *It took Amy five blows to move the boat across the water tray. Do you think it will take you more or fewer blows? Make a sensible guess for how many blows you will take to blow your boat across.*
- *It took three cupfuls to fill the jug. The bucket is bigger than the jug, so I think it will hold more than three cupfuls. What do you think? Make a sensible guess for how many.*

Context: Water play

Illustrated learning outcomes

- Begin to make comparisons between quantities (CS Phase 1)
- Use some number language such as 'more' and 'a lot' (CS Phase 1)
- Know that the last number in the count gives the total (CS Phase 2)
- Count actions or sounds (CS Phase 3)
- Find one more or one less than a number from 1 to 10 (CS Phase 4)
- Estimate a number of objects that can be checked by counting (CS Phase 5)

Look, listen and note:

- the methods children use to describe and compare capacities
- the language children use to describe and compare capacities
- children's ability to count objects and actions accurately
- how children keep track of how many times a smaller container has to be poured to fill a larger container
- whether children use prior experience or reasoning to make sensible estimates

Resources and suggested activities

- Assorted containers and pourers including:

  jugs bottles spoons

  funnels tubing straws

  Include containers with measuring scales.
- Objects to place and count into containers:

  natural objects such as conkers, pebbles

  manufactured objects such as marbles
- Boats and materials to make boats

Scaffold activities with boats to encourage children to make comparisons and predictions, for example:

- invite children to choose materials then design and make boats;
- encourage them to choose an object to fill their boat;
- ask questions that encourage counting and comparison, such as:
  - *How many people can you fit on your boat before it sinks?*
  - *Whose boat carries most people?*
- prompt children to make predictions:
  - *You can fit eight people in your boat. How many conkers do you think will fit?*

- Place a number track by the water tray to support children's counting.
- Provide mark-making equipment and plastic numerals so that children can choose to record relevant numbers.

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Role of the adult

Introduction

When young children are left to their own devices in a stimulating environment, most will learn through their own exploration and play, following their own ideas and motivations. Early Years practitioners play an important role in providing the building blocks for such independent exploration – materials, time, space and a supportive emotional environment.

Yet this is not enough. Adults have a crucial role in stimulating and supporting children to reach beyond their current limits, inspiring their learning and supporting their development. It is through the active intervention, guidance and support of a skilled adult that children make the most progress in their learning. (*Learning, Playing and Interacting: Good Practice in the Early Years Foundation Stage* Ref: 00775-2009BKT-EN)

The skilled teacher offers children a blend of experience and stimuli that involves careful selection and choice. Their pedagogic approach is such that they can refine and adapt what they do as the child's needs change and they become more sophisticated learners over time.

This section of *Numbers and patterns: laying foundations in mathematics* comprises examples of activities which provide starting points when working with children within a particular phase. They are not designed to be used as scripted activities. The activities emphasise the role of adults in modelling and supporting children to make accurate use of the language and vocabulary of mathematics. They also support observation by suggesting opportunities to look, listen and note what children say and do. There is one set of activities for each phase of the Number words and numerals theme and one for each phase of the Counting sets theme.

Each set of activities follows the same format:

- an overview of the phase suggesting key vocabulary, effective practice and opportunities to look, listen and note;
- an overview of the foci of the activities;
- some examples of activities in which adults can support and extend children's mathematical learning and development.

This section also includes an example of how mathematical learning may be developed through a relevant topic or theme in which children are engaged across the curriculum.

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Language

Extending the learning – the importance of talk

Explaining, talking and discussing are very important parts of learning mathematics and a valuable life skill. We should focus on creating situations that support discussion and be sure to ask open-ended questions such as:

'I wonder what will happen when…?'

We need to encourage children to use descriptive language, and you can extend children's conversations by encouraging them to say what they are doing and why. All young children need to talk and reflect on their experiences.

Extract from *Maths Outdoors* (2005) by C. Skinner. © BEAM.
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The activities contained in this section aim to illustrate opportunities for dialogue among children and between children and adults. Speaking and listening skills are crucial to the development of children's strategies to problem-solve and tackle mathematical problems. From an early age, children need to learn how to talk about their work and how to explain their strategies and decisions they have made. Adults therefore have a vital role in developing children's use of language alongside mathematical concepts.

The following strategies have been developed from those identified as supportive to the language aquisition of children learning English *(Supporting children learning English as an additional language: Guidance for practitioners in the Early Years Foundation Stage,* Ref: 00683-2007BKT-EN*)*. These strategies are just as appropriate and important when supporting the language development of all children.

- **Modelling**: Children need to hear language used in contexts that illustrate the essential meaning of the vocabulary, before they can rehearse and use it themselves. Introducing a variety of contexts allows the children to recognise and absorb the common features of the language within these contexts. They can then test out the language later in other contexts and, over time, refine its use. Modelling is also a useful strategy to correct mistakes rather than simply telling children they are wrong.
- **Questioning**: It is important to use a range of questions, including open questions (see below), and prompting, probing and promoting questions.
  - *Prompting questions* help children to engage with and use the language. *This shape is a square. Can you pick shapes from the box and tell me if they have a square face or not?*
  - *Probing questions* are intended to determine the security of the child's learning. *How did you decide there were fewer cars in this box than in that box?*
  - *Promoting questions* take children's thinking on. *This glove belonged to a giant – how can we decide how big his hand was?* Children should be encouraged to ask promoting questions when they talk with other children and with an adult.
- **Talking to children as you play alongside them**: Use the appropriate language to think aloud when interacting with the children. While taking part in an activity, give the children a commentary of what you are doing, for example, *I have four pencils, one, two, three, four, and I've found one more. Now I have five pencils*. As you talk, explain your thinking and reasoning, for example:
  - *I rolled five on my dice; that means I can move five squares on the board, one, two, three, four, five. I hope I don't roll a two and land on this snake.*
  - *If I take this blue shape and put it here it covers the whole of the red shape, so it must be bigger.*

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- **Recasting or remodelling**: This provides a positive way of dealing with any errors children make as they develop their use and understanding of mathematical language. For example, when identifying the position of numbers on a number line a child might say, *Six comes behind seven*. The adult could then say, *That's right, six comes before seven*.
- **Repetition**: This is important to reinforce and confirm children's own attempts at speech. By repeating and adding to a child's spoken language you will scaffold their language development, consolidating and adding to their knowledge of language structure. You can use songs and rhymes to introduce repetition of vocabulary.
- **Enunciation**: Children need to hear words and phrases spoken accurately, clearly and precisely. For example, reinforce the enunciation of 'thirty' as distinct from 'thirteen' and make sure the beginning and ends of words are expressed clearly and not too quickly.
- **Time**: Children need time to think, reflect and quietly absorb the language used around them. Return to the language that was used on a previous occasion to check the child's recall and security.
  - *Do you remember what name we used for this shape?*
  - *I can see five cars on this page – can you find them for me?*
  - *If this box has eight toys and I take one out, does that mean there is one more or one fewer toy in the box?*
- **Using language in a familiar and relevant context**: Introduce mathematical language into familiar daily routines and activities, helping children to make connections with what they know. For example, count pencils to check they are still there at the end of the day, name shapes in the outside play area, find how many children are having hot dinners today.

Vocabulary

Each set of activities includes some suggested vocabulary for children working within the theme and phase.

Informal, everyday language is often used in mathematics before or alongside mathematical vocabulary. Although this can help children to grasp the meaning of different words and phrases and to develop their understanding of what these words and phrases describe, a structured approach to the teaching and learning of vocabulary is needed if children are to move on and begin using the correct mathematical terminology.

The introduction of new words needs to be planned. The vocabulary should be used alongside exploration of real objects, mathematical apparatus, pictures or diagrams. This will provide visual images and tactile experience of what mathematical words mean in a variety of contexts. Children need to encounter and use new words frequently; include opportunities for them to listen to adults and other children using the words correctly, so that they gain confidence in using the new words and phrases in complete sentences.

When introducing new mathematics vocabulary, be aware of words that may mean something different in mathematics to those in an everyday context, for example, *order*, *take away*, *odd*, *flat*, *left*.

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Questioning

One of the key findings from *Researching Effective Pedagogy in the Early Years* (REPEY) was that 'periods of "sustained shared thinking" are a necessary pre-requisite for the most effective early years settings' and 'open-ended questioning is also associated with better cognitive achievement.'

However, many questions asked are closed questions that have a single correct answer, such as:

- *How many teddy bears are there?*
- *What number comes after seven?*
- *Two and one more is?*
- *How many corners has this shape got?*

Excessive use of closed questions can narrow learning, particularly if the questions do not lead to children taking part in dialogue that promotes and develops their use of language. Adults sometimes ask questions to which they already know the answer, for example, *How many children are standing on the logs?* or *Which play-dough snake is longer*? Young children very quickly recognise that these questions have 'right' and 'wrong' answers. Some children, usually those who know the 'right' answers, will willingly join in with this closed questioning, particularly as they realise this will please the adult asking the questions. However, other children will go to great lengths to avoid answering these closed questions, to avoid giving a wrong answer. Sometimes, they 'vote with their feet', moving away when practitioners attempt to join in with play. At other times, they fail to engage in group sessions that involve these types of question.

It is therefore important to think about the sorts of question we ask, and the enabling statements we use, to support sustained and shared thinking and dialogue with children. There are many ways to begin open-ended questions, for example:

- How can… (*we make sure we have enough strawberries for everyone)*?
- What will you need… *(to make this necklace longer than that one)*?
- Explain to me why… *(you think that bear won't fit in the box).*
- How do you think we could… *(make sure we all get the same number of beads)*?
- How can you… (*make this pattern with these beads)*? Why do you think… (*this will not work)*?
- What did you notice about… (*the collection of cars)*?
- I wonder what would happen if… (*we put these two shapes together to make a new shape)*?
- If we… (*put this stone in this tube of water)*… what do you think will happen? Why did… (*the water move up the tube)*?
- My…(*shape)* is different from… *(your shape).* Tell me some of the things that are the same and the things that are different.
- What could we do to… (*remember the number of children who have made sandwiches)*?
- What can we… (*buy in the shop with these coins)*?

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Number words and numerals: Phase 1

Phase 1 focuses on the development of children's awareness, understanding and use of the language of number. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, order, count, pattern, a lot, more, few, less, same, next, one, two, three…

How many…? Which/what number…? What does this number tell us?

Effective practice

- Look for opportunities to use the language of number in different contexts. Children need to hear number vocabulary, such as the sequence of counting numbers, in a variety of relevant contexts in order to begin to recognise number names and appreciate the roles numbers play.
- Model how to use numbers by 'thinking out loud'.
- Maximise opportunities for children to use their emerging number vocabulary, for example, by providing appealing selections of objects and containers to use in play.
- Incorporate the use of numbers into everyday routines, as these provide an ideal opportunity for children to develop and apply their understanding of number in meaningful contexts. For example, put five aprons onto five labelled pegs near the water-play area and discuss their use with the children.
- Help children to develop a sense of number through contexts that are relevant to them. For example, ask them to choose one piece of fruit at snack time or place their two shoes under their peg.
- When children refer to numbers in the environment, take time to listen, discuss their ideas and ask probing questions.
- Make use of special events to discuss the importance and roles of numbers.
- Show children how numbers can be used to describe how many objects there are in a set (*We have five bikes outside*) or to label objects (*I take bus number 5 to get home*). Ask questions that help children understand these roles: *Can we all play on the bikes at the same time? What would happen if I took a different number bus?*
- Help children to recognise, describe and continue patterns in a variety of contexts, for example, the pattern created by pairs of shoes organised in a row or a regular rhythm repeated on a drum.

Look, listen and note:

- the contexts that promote children's use of number words;
- children's spontaneous use of number and quantity words during play;
- instances in which children use a number accurately to describe how many objects there are in a set;
- how well children demonstrate understanding of numbers used as labels;
- any correct sequences of numbers that children use spontaneously.

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Areas of focus for each of the example activities

	We're going on a number hunt	Role-play number talk	Happy birthday to you	How old are you?
Page	7	7	8	8
Show an awareness of numbers in their environment	✓	✓	✓	
Offer comments or ask questions about numbers, demonstrating their curiosity	✓		✓	✓
Use some number names and number language accurately	✓	✓	✓	✓
Say some number names in sequence		✓		✓
Recognise and continue repeating patterns				

	One or lots?	What comes next?	What's in the box?	Skittles
Page	9	10	10	11
Show an awareness of numbers in their environment	✓		✓	
Offer comments or ask questions about numbers, demonstrating their curiosity			✓	✓
Use some number names and number language accurately			✓	
Say some number names in sequence				✓
Recognise and continue repeating patterns		✓		

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We're going on a number hunt

You will need: areas within the environment where numbers are used as part of the daily routine

Explain that you are going on a number hunt together but first you are going to think about numbers for a while so you know what you are looking for. Use prompts to promote discussion about numbers, such as:

- *Let us see how many number words we can think of together.*
- *Earlier in the day, I used numbers when I ... Who else thinks that they have used numbers today and can tell us about it? How did numbers help you?*

Respond to children's comments and encourage them to respond to each other.

Now go on a number hunt. Each time you find a place where numbers might be used, talk with the children about how numbers are important in that place and how they could help you. Encourage children to show you how they might use numbers, to make comments and to ask questions. *Can anyone think why the number 5 is important here? There are five aprons as there is only room for five people to paint at once.*

Taking ideas further: Take photos and make a display or book that can be added to, over time.

Role-play number talk

You will need: play equipment that involves numbers, such as clocks, money

Observe children in role-play. Note the contexts and characters they are exploring, the language they are using and whether they use any number language spontaneously as part of their role-play.

Devise a character for yourself that fits into the children's chosen context and sensitively join in the role-play. Look for natural opportunities to model the language of number, for example: *Hmm, how many bananas are in this bunch? One, two, three, four – there are four bananas. That's enough.* Observe how children respond; they may ignore your use of numbers, mimic it or use number language at their own level, for example, counting objects and using a mix of actual and made-up number words.

Where it will not 'hijack' the role-play, engage children in some interactions that require direct responses, such as: *I'd like some apples. Let's see, I need one for me, one for Ellie and one for Sam* (using fingers to represent each person). *So that's one, two, three. Can I have three apples, please?* Note how children react. Respond in role.

Taking ideas further: To support role-play, over time, provide:

- appealing objects and containers to encourage children to sort and count;
- everyday equipment involving numbers, such as calculators, tills, scales;
- number cards, stickers and stamps.

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Happy birthday to you

You will need: a display table with birthday items for all ages in the group

Lay out balloons, badges, candles, cards... on a display table. Encourage discussion about the objects. Use prompts such as:

- *When do you usually see objects like this?*
- *What is special about them?*

Respond to children's comments and encourage them to respond to each other.

Use prompts that encourage children to link the objects to 'age', for example:

- *Choose an object that is suitable for you. Why did you choose this one?*
- *On your last birthday, how many candles were there on your cake? Why?*

Encourage children to talk about their age. If necessary, use prompts such as:

- *How old are you now?*
- *How old will you be on your next birthday?*

Encourage children to talk about other people's ages. Children might know their mum's age or might say that their brother or sister is older or younger than they are. Where possible, draw out understanding of the terms *older* and *younger*.

Taking ideas further: Provide boxes or hoops so that children can sort the objects, choosing their own criteria. Make the objects available for use in role-play.

How old are you?

You will need: a camera, a display board and paper or card to decorate it

Start a discussion about age by modelling appropriate language, for example: *The number 35 is special to me because it is my age. I am 35 years old.*

Ask children to tell each other about their ages. Encourage children to respond to and ask questions of each other.

Set up an activity to organise children into age groups:

- *Sit close to Joe if you are the same age as him.*
- *Zoe is sitting close to Joe. What does this tell us about Zoe?*
- *Megan isn't sitting close to Joe. Why might that be?*
- *Sit by Megan if you are the same age as her. Are children in Megan's group older or younger than children in Joe's group? How do you know?*

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Explain that you want the children to help make a display so that everybody who comes into the room knows how old all of the children are. Say that you will take photos of everyone for the display. Ask children to suggest ideas for the display. Use prompts such as:

- *What ages must we have on our display?*
- *How could we decorate the display so that everyone's age is clear?*

Organise resources so that children together make or decorate items suggested for the display. Take a photograph of each child. Ask children to place their own photographs appropriately on the display.

Taking ideas further: Discuss what needs to happen on children's birthdays. Make changing the display part of children's birthday celebrations.

One or lots?

You will need: pictures or photos of objects individually or in bigger groups (e.g. one mouth, a bunch of flowers)

Lay the cards out on the floor or table and explain that you are going to use them to play a game. Invite individual children to choose a card and describe what is on it. You may wish to model the use of number language, for example: *My card shows lots of different-coloured flowers.*

Replace the cards on the floor or table. Explain that each card shows *one* object or *lots of* objects. Explore this together, using prompts such as: *This card shows one object – one television. Who can spot another card that shows one object? I wonder how many cards we can find that show lots of objects.*

Turn all of the cards face down. Explain the game to the children: they take turns to choose a number word, *one* or *lots*, then turn over a card. If the picture matches their chosen number word then they keep the card. If it doesn't match, they replace it. Model how to play the game by taking the first turn and 'thinking out loud': *I can choose 'one' or 'lots'. My choice is 'one'.* (Turn over a card.) *If the picture shows one object, I can keep it. Can I keep it? What do you think?*

Taking ideas further: Provide boxes or hoops so that children can sort the cards according to their own criteria. Encourage children to make their own cards to add to the pack. Encourage them to develop their own games to play with the cards.

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What comes next?

You will need: strips of coloured paper, stickers, stamps or sponges and paints

Invite children to use stickers or stamps to make a pattern. Encourage them to watch as you create a repeating pattern and describe it, for example: *I am going to print a red car then a yellow boat. To make a pattern, I am going to keep repeating a red car then a yellow boat, a red car then a yellow boat... Does anyone know what I am going to print next? Who thinks they can describe my pattern?*

Encourage children to continue some patterns that you have started and then to make their own repeating patterns. Prompt them to explain what they are doing. Use questions such as:

- *You have started with a pink flower, what are you going to print next?*
- *I think you might be going to print an orange cup next. Am I right?*
- *Can you tell me about your pattern?*

Taking ideas further: Make a display of the patterns and use it as a basis for discussion. Show children items such as wrapping paper or borders that demonstrate pattern and ask them to describe what they can see. Encourage them to collect objects that show repeated patterns.

What's in the box?

You will need: sets of appealing objects and boxes (ask parents to bring in any unwanted gift boxes from home.)

Choose five special boxes. Place a different number of objects into each box. For example, you might place one heavy object into one box, two objects that make a lot of noise into another, three very tiny objects into a third, four objects into another and lots of very light objects that make very little sound into the last box. (The sort of bows that go on presents are ideal if they are packed tightly.)

Ask children (five or fewer) to sit in a circle around the boxes. Invite them, in turn, each to choose a box. Encourage them to pick their box up and shake it, but not to open it yet. Ask them to explain what they think might be inside. Each box should be carefully handed around the group for others to offer their thoughts. Take one turn yourself, to model appropriate language, for example: *Hmm, this box is quite light, so I think there might only be a few things inside. I can hear the objects chinking, so I think they might be made of metal.* Encourage children to compare ideas. Use prompts such as: *Daniel thinks that there might be only one object in this box because it is so light. I wonder if everyone else agrees.*

When everyone in the group has had a turn to handle the box, encourage the child who chose it to open it, reveal and describe what is inside.

Taking ideas further: Make the boxes and sets of objects, with digit cards, available for children to use in their own play and games.

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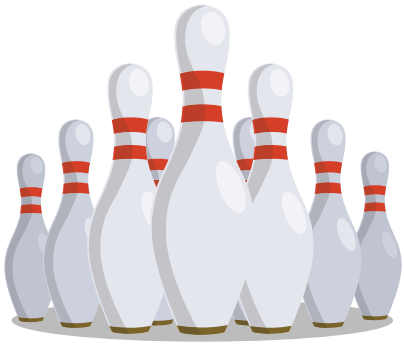
Skittles



You will need: a set of skittles and some balls

Make the skittles available outside. Encourage groups of children who choose to play with them to take a short time to discuss how they are going to play. Use prompts such as: *What do you do when it is your turn? How will you make sure that the game is fair?* Listen particularly for examples of children choosing to use number words as part of their description.

Observe children as they play their game and note any number language they use spontaneously. As children play, if it is appropriate, use commentary, prompts or questions to encourage them to work out their scores: *Good throw, David, you knocked down more that time. How many skittles fell? I wonder who scored most in that round. How can you tell?*

Taking ideas further: Provide counters and mark-making equipment, such as chalk or a flipchart, and ask children to consider how they could keep track of who had scored most in the game.

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Number words and numerals: Phase 2

The main focus in Phase 2 is the development of children's knowledge and use of the number sequence from one to five and recognition of the numerals 1 to 5. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, order, count, after, one, two, three, four, five, forwards, backwards, straight, curved, What number comes next? How many…? What does the number look like?

Effective practice

- Use number rhymes to provide a medium for embedding the counting sequence one to five. Revisit rhymes regularly so that children sing them confidently. Include rhymes with an element of pattern.
- Support the singing of number rhymes with actions, objects and images to reinforce the numbers involved.
- Put together number rhyme packs containing puppets or other representations, together with a copy of the rhyme, so that children can share their favourite rhymes with carers at home.
- Say number names clearly, emphasising the movements of your mouth to help children learn to pronounce number names accurately.
- Help children make the link between each number word, from one to five, and its numeral, for example, by providing numbered headbands to match a rhyme or by pointing to a number on a number track as you say its name.
- Establish a number-rich environment; for example, number the bikes and paint numbered parking spaces in the outdoor environment.
- Provide resources children can use to represent numbers within their play, such as chalk, whiteboards, magnetic numerals, number cards and stamps.
- Ensure that children see numerals that are hand-written and some that are computer-generated in a variety of different fonts.
- Offer children visual and tactile opportunities to explore the shape of numerals, for example, running fingers over felt numerals or feeling for wooden numerals in the sand tray. Talk about the shape of numerals 1 to 5, discussing whether they are made up of curves, straight lines or both.

Look, listen and note:

- the range of numbers that children spontaneously recite, in order, when counting or in play;
- the range of numbers that children recite backwards as part of a rhyme or 'countdown';
- how children demonstrate their knowledge of the order of numbers, for example, through saying that two comes before three or ordering the digits 1, 2, 3;
- which numerals children recognise;
- the personal numbers that children refer to, such as their age or house number.

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Areas of focus for each of the example activities

	Rhyme time to five	Today's special number	Number detectives	Zig-zag number book
Page	14	14	15	16
Recognise some numbers of personal significance		✓		
Count forwards and backwards within the number sequence 1 to 5	✓			✓
Order numbers in the range 1 to 5				✓
Recognise, say and identify numerals 1 to 5		✓	✓	✓

	Making numbers	Envelope number track	Number search	Ride the bike
Page	16	17	17	18
Recognise some numbers of personal significance	✓			✓
Count forwards and backwards within the number sequence 1 to 5		✓	✓	✓
Order numbers in the range 1 to 5	✓	✓	✓	
Recognise, say and identify numerals 1 to 5	✓	✓	✓	✓

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Rhyme time to five

You will need: a collection of number rhymes to five, related objects such as a cardboard beehive, bee headbands, masks, puppets, props as appropriate

Explain to the children that you need their help with a number rhyme such as:

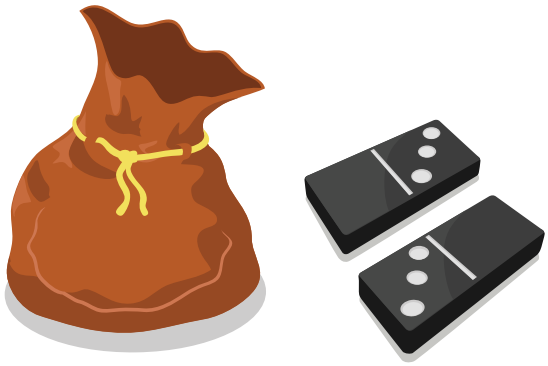
Here is the beehive. Where are the bees?
Hidden away where nobody sees.
Watch and you'll see them come out of the hive.
One, two, three, four, five… Bzzzzzzzz!

Help children to learn words and actions. Use prompts such as: *Let's sing that line again. Join in with the words you remember. Who can show us the actions?*

Where possible, invite children to act out the rhyme; for example, invite children to hide behind a cardboard beehive and come out, one by one. Use props or costumes such as bee headbands; these could be decorated with the numerals 1 to 5 to reinforce recognition of numerals and the order of numbers 1 to 5. Alternatively, you might make bee finger-puppets and show the five bees on fingers.

Taking ideas further: Encourage children to make their own masks or puppets. Create number rhyme bags that contain objects, props and puppets, together with a copy of the rhyme, for children to use in their play or to take home and share with carers. There are lots of number rhymes on the internet; search to find new ideas.

Today's special number



You will need: a display board or table, a feely bag, wooden or plastic numerals and other representations of numbers such as pictures, dominoes, number tracks

Invite children to put their hands into the bag and feel today's special number. Use prompts and questions to encourage them to describe the number.

- *It might have straight edges. It might have curved edges. Run your fingers along the edges. What can you feel?*
- *I wonder if it could be the number 1. What do you think? Why?*

Ask a child to take out the special number. Encourage a discussion about it.

- *Your guess was right, Jess, it was the number 3. What gave you clues?*
- *What do we know about the number 3?*

Encourage children to offer comments and questions about the number: a child might say that they can count up to three, that there are three bears in the story of Goldilocks or that their little brother is three years old. Model number language for the children by making your own statements, such as: *When we are counting, the number two comes just before number three. I wonder if anyone can say what number comes after three.*

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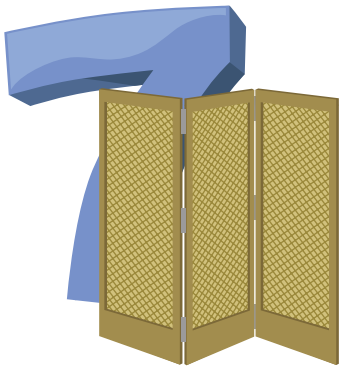
Place the numeral on the display. Ask children to collect objects for the display.

Taking ideas further: Provide pictures, dominoes, etc. for children to sort and add to the display. Have a short circle time later to share examples of using the number, in relevant rhymes, stories, etc.

Number detectives



You will need: large wooden or plastic numerals or numeral cards, a screen

Explain to children that there is a number hidden behind the screen and that they will need to look carefully to find out what it is. Slowly raise part of the number above the screen. Encourage children to talk about what they can see. Use prompts such as: *What shapes can you see so far? I wonder if this gives us any clues.*

You may wish to model descriptive language and reasoning by 'thinking aloud', for example: *I can see two straight lines* (pointing to them) *that are joined. I don't think it can be the number 8 because the number 8 is made up of curved lines.*

Gradually reveal more of the number and give children opportunities to say what they think now. As children become more experienced at this activity, ask them questions such as: *What numbers could it be? What couldn't it be?*

When the whole numeral is finally revealed, ask children to describe it. You may need to model descriptive language initially, for example: *The number 7 is made up of two straight lines, one short one along the top and one longer one that slopes down. Can someone come and point to the two straight lines?*

Taking ideas further: Carry out similar activities, using different equipment, for example, the interactive whiteboard, feely bags, sand trays; as you describe the number at the end, ask children to close their eyes and try to picture it.

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Zig-zag number book

You will need: paper folded into zig-zag books, cut-out numerals or numeral stamps, pictures, object stamps, catalogues and art materials

Show children a zig-zag book that you have made (or that another child has made). Explain that it is a number book about the numbers from one to five. *Who can say the numbers from 1 to 5? There are pictures on each page to match each number.*

Read the book together and discuss it with the children. Use prompts such as: *What can you see on this page? There are three cars on this page; how many objects do you think might be on the next page?*

Show children the paper and number resources you have put out for them to use and suggest that they gather any other resources they want. Encourage them to make their own zig-zag books. Observe and note their use of numbers. Read and discuss children's books with them. Use prompts such as: *How many objects are you going to put here to match this number? What are you going to put on the next page? Which number do you need next? How do you recognise it?*

Taking ideas further: Display books, encourage children to read each other's and share them in story time. Make resources available for use in their play. Ask parents to send in photographs showing one, two, three… people, to use in a zig-zag book.

Making numbers

You will need: plastic or wooden numerals, number stamps and cutters, art and craft materials, including modelling dough

Invite children to make numbers in the creative area. Show children the number resources you have prepared and encourage them to gather other resources they want to use. Start to make some numbers yourself and encourage children to join in.

Model the use of mathematical language by 'thinking aloud', for example: *I am going to see if this pipe cleaner is bendy enough to make the number 2. I need to make a big curve like this. Now the last bit needs to be straight.*

Observe children working; talk with them about what they are doing. Use description, questions and prompts such as:

- *Look, Ben has made the numbers 1, 2 and 3. I think I know which number he might make next.*
- *Which of the numbers could you make using just straight art-straws?*

Taking ideas further: Make a display of children's numbers and look at it together; use it to explore number recognition and ordering. Children might make a picture or book showing personal numbers they recognise, such as their house number or age. They might decorate their numerals with an appropriate number of objects.

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Envelope number track

You will need: a washing line, five large envelopes labelled 1 to 5 and stapled with strings, pegs to attach them to the line, objects showing numerals or numbers, for example, dominoes

Show children the envelopes and encourage them to discuss the numbers. Use prompts such as: *What is written on the envelopes? Choose a number you recognise. How did you recognise it?*

Ask children to take the envelopes and attach them to the line. Together, read the numbers as they appear on the line, for example: *Three, five, two, one, four.* Encourage children to work together to put the envelopes in order. Use prompts such as: *Which number do we usually start with when we count? Let's put this number first on the line. Which envelope shall we put next? Let's read what the numbers say now…*

Show children a collection of pictures and objects representing the numbers one to five. Model how to sort the objects by choosing one and 'thinking aloud': *This domino has five dots on it altogether so I am going to put it into envelope number 5.*

Encourage children to work together to post the objects appropriately, explaining their choices. Suggest that they might add other objects to the envelopes if they find suitable objects around the building.

Taking ideas further: Play 'Swap', asking children to spot which two envelopes have been swapped round. Play 'Odd one out' by moving one object into the wrong envelope. Give children opportunities to make number tracks, using a variety of resources such as numbered boxes, floor tiles, large number cards or chalk.

Number search

You will need: large wooden or plastic numerals or number cards from 1 to 5

Explain that the numbers 1 to 5 are hidden inside and outside. Prompt children to think about these numbers by asking questions such as: *Who can suggest one of the numbers that is hidden?*

Tell the children that the numbers have each been hidden so that a small part is showing. Explain that, when they find a number, you would like them to guess what it might be without moving it. Suggest that children search in pairs. Say that you will call the group back together to tell each other which numbers they have spotted and where they are.

When they have had enough time, gather the children together again. Walk around with them, to explore and discuss which numbers children have found. Use prompts such as: *Tom, take us to a number you found. What number do you think it is?* Encourage children to describe what they can see and predict what each number is before they take it out to check.

Model appropriate language, for example: *I can see the top of a curved edge. It can't be number 1 because that only has straight edges. It might be the number 2 or the number 3. They both have curved edges. Let's have a look. Oh yes, it is a number 3, because it is made up of two curves.*

When you have found all five numerals, discuss the numbers with the children. Use prompts and questions such as: *One of the numbers is made up of curves with no straight lines. Who can point to this number and tell us its name? Show me a number you recognise. Let's put the numbers in order together. How can we do this?*

Taking ideas further: Hide a mixture of letters and numbers in a similar way for children to recognise and sort. Make wooden or plastic numerals available for children to use as part of their play.

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Ride the bike

You will need: bikes, number cards**,** number tiles, chalk

Number the bikes with number cards, if they are not already labelled. Use chalk to mark out corresponding numbered parking spaces. Mark out other obstacles that involve numbers, for example, a zig-zag route between islands showing the numbers 1 to 5.

Observe children as they choose to play on the bikes. Note the language they use and whether they use any number language spontaneously. Where it will not disturb their play, interact with children. Use description, prompts and questions such as:

- *Amy has chosen bike number 2. Which bike are you going to choose, Millie?*
- *Where are you going to park your bike? Why did you choose that space?*
- *I am going to walk along this route from number 1 to number 2.*
- *Which number did you just ride over? Where are you going to go next? Can you go to the next number?*

Taking ideas further: Change the numbering of parking spaces. Over time, provide different equipment for children to use, to create their own obstacle courses.

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Number words and numerals: Phase 3

The main focus in Phase 3 is the development of children's knowledge of the number sequence from one to nine and recognition of the numerals 1 to 9. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, order, count, one, two, three, four, five, six, seven, eight, nine, ten, forwards, backwards, next, before, straight, curved, What number comes next? How many...? What does the number look like?

Effective practice

- Make regular opportunities to chant the number sequence, forwards and backwards, in unison, including through number songs and rhymes.
- Support the singing of number rhymes with actions, objects and images.
- Provide opportunities for children to join in with, recognise and continue counting patterns, for example, when counting, pause the count and ask: *What comes next?*
- Say number names clearly, emphasising the movements of your mouth to help children learn to pronounce number names accurately.
- Ensure that children have opportunities to hear the number being said, at the same time as seeing the corresponding numeral and number word, to make the connection between the three forms.
- Provide children with models and images showing the sequence of counting numbers, for example, number tracks and number lines.
- Provide resources children can use to represent numbers within their play, such as chalk, whiteboards, magnetic numerals, number cards and stamps.
- Ensure that children see numerals that are hand-written and some that are computer-generated in a variety of different fonts.
- Offer children visual and tactile opportunities to explore the shape of numerals, for example, running fingers over felt numerals or feeling for wooden numerals in the sand tray. Talk about the shape of numerals 1 to 9, discussing whether they are made up of curves, straight lines or both.

Look, listen and note:

- the range of numbers that children spontaneously recite, in order, when counting or in play;
- the range of numbers that children recite backwards, as part of a rhyme or 'countdown';
- how children demonstrate their knowledge of the order of numbers, for example, through saying that eight comes before nine or ordering the digits 5, 6, 7;
- which numerals children recognise;
- how well children continue number sequences.

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Areas of focus for each of the example activities

	Pit stop	Rhyme time to ten	Number-plate bingo	Treasure track
Page	21	21	22	22
Count forwards and backwards within the number sequence 1 to 10		✓		✓
Recognise, say and identify numerals 1 to 9	✓	✓	✓	✓
Order numbers in the range 1 to 9	✓	✓		✓
Say the number that comes after a given number within the number sequence 1 to 10	✓			✓

	Circle counting	Squeeze and squirt	Missing number	Up my street
Page	23	23	24	25
Count forwards and backwards within the number sequence 1 to 10	✓		✓	✓
Recognise, say and identify numerals 1 to 9	✓	✓	✓	✓
Order numbers in the range 1 to 9	✓	✓	✓	✓
Say the number that comes after a given number within the number sequence 1 to 10	✓	✓	✓	

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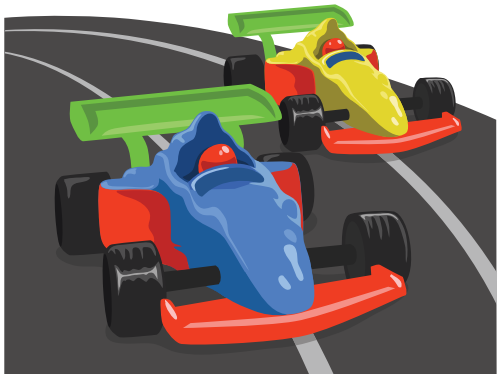
Pit stop



You will need: toy cars or remote control cars, number cards 1 to 9, chalk, tape or other resources to create a track

Make the equipment available outside. Invite children to make a racetrack for the cars. Give children the 1 to 9 cards, mixed up, and explain that on a racetrack there are pit stops, which are places where drivers stop to get new tyres or fuel. Ask children to put the numeral cards as pit stop markers round the track, in order. Watch how the children do this. If necessary, offer prompts such as: *Which number do we start with when we count? Where are you going to place this number? What will you do next?*

Observe and listen to the children as they play with the cars. If it will not disturb their play, you may wish to join in. Interact with children by describing the action and offering prompts such as: *I have just driven past pit stop 6. Pit stop 7 is next. I am going to stop there. What about you?*

Encourage children to describe what they are doing as they play. You may wish to model the role of race commentator, then suggest that a child takes over the role.

Taking ideas further: Make the equipment available for their play. Provide a sound recorder for children to record race commentaries.

Rhyme time to ten

You will need: a collection of number rhymes and songs to ten, related objects such as masks and puppets, headbands or number cards 1 to 10

Explain to the children that you need their help with a number rhyme, for example:

Ten green bottles hanging on the wall
Ten green bottles hanging on the wall
And if one green bottle should accidentally fall
There'll be nine green bottles hanging on the wall…

Invite ten children to act out the rhyme. Hand each of them, randomly, a number card or a numbered headband (1 to 10). Invite the 'ten green bottles' to stand in a line 'on the wall' and then, together, read the numbers in the order they appear, for example: *three, six, four, eight, nine, ten, two, seven, one, five*. Encourage children to work together to move the 'bottles' into order, with prompts such as: *Which number do you think we should start with? Let's read the numbers again. Are they in the right order yet? Which numbers need to move?*

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Once the 'bottles' are in the right order, read the numbers in order before singing the song together. Encourage children to act out the song, for example, in the first verse 'bottle number ten' should fall down leaving 'bottles' one to nine standing.

Taking ideas further: When the children feel confident with the counting rhyme, record them singing it and use the tape in the listening area, together with the book and small-world scene. There are lots of number rhymes on the internet; search to find new ideas.

Number-plate bingo

You will need: yellow card, black paint, sponges shaped as numerals, digit cards, counters

Show the children a number plate that you have made by printing five different digits onto yellow card. Ask questions such as: *Which numbers on my number plate do you recognise? Can someone read my number plate?*

Encourage each child to make their own number plate by choosing their own digits to print. As they work, ask questions such as: *What number are you going to choose next? Whose number plate has the number 5 on it?*

Play 'Number-plate bingo'. Pick a digit card from the pack and show it to the children. Discuss features of the number, using appropriate language, for example: *Look how this number is made up of two straight lines. What number is this? Who has this number on their number plate?*

Children should put a counter on that digit if it is on their number plate. The aim of the game is to be first to have a counter on each digit on your number plate.

Taking ideas further: Make the equipment available for children to use in their play, for example, children might make number plates for the bikes. Make letter stamps available as well; discuss which symbols represent numbers and which represent letters.

Treasure track

You will need: number floor tiles or cards 1 to 9, nine objects, a nine-sided dice with numbers 1 to 9 on it (or digit cards), tape

Show children the shuffled number tiles or cards. Talk about the numbers. Use prompts such as: *Find a number you recognise. What is its name? How do you recognise it? Which numbers are made up of just straight lines?*

Explain to the children that you are going to work together to put the tiles or cards in order, to make a number track. Help children to work together to put the numbers in order. Use prompts, for example: *Which of these numbers do we usually start with when we count? Who can find that card? Which number comes next?*

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Once the cards are in order, count together along the number track: *One, two, three… nine*. If you are using number cards, attach them firmly to the floor with tape, so that children can jump along the track. Alternatively, use chalk to draw the number track on the ground. Show children a range of objects, for example, a keyring, a peg, and ask them to put one object on each number.

Explain the 'Treasure-track' game: children take turns to roll the dice, then take that number of jumps along the track. If there is still an object on the number they finish on, they take it. Model how to jump along the track, counting each jump: I *rolled the number 3, so I am going to jump one, two, three. I've landed on the number 3 so I can take this keyring*. As children play, use prompts such as: *What number do you want to roll? Can anyone say where they think Joe is going to land?*

Taking ideas further: Provide a variety of number tracks for children to use in their play, such as vertical number tracks or hopscotch grids. Provide equipment such as objects, dice and number cards that children can incorporate into play.

Circle counting

You will need: number cards 1 to 9

Invite the children to sit in a circle. Place the number cards in the middle of the circle. Encourage children to talk about the numbers. Use prompts such as: *Who can find a number that is made up only of curved lines? What number is that?*

Ask each child to select a number they recognise and say what number they have chosen. As each child chooses, ask questions such as: *Billy chose the number 5. What number comes after Billy's number when you count?*

When everyone has chosen a number, ask children each to say their number around the circle. Ask: *Are these numbers in the right order?* Encourage children to change places until the numbers are in the correct order. Use prompts such as: *Who needs to go first? Which number should come after this one? Who needs to move where?*

Once the numbers are in order, count around the circle, forwards and backwards.

Taking ideas further: Begin to develop patterns, for example, by whispering then shouting alternate numbers. Change the direction of the count on your drum beat.

Squeeze and squirt

You will need: plastic bottles numbered 1 to 10, squeezy bottles filled with water

Invite children to play with the squeezy bottles. Suggest that they put the numbered bottles in a line so that the numbers are in order. Observe how they do this. You may want to offer them prompts such as: *One, two, three, four, five… What number comes next?*

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When all the bottles have been put up, encourage the children to count along the line to check that they are in the correct order.

Show children how the water-filled squeezy bottles can be squirted to aim a jet of water that knocks over the numbered bottles. Model the use of number language to describe what you are doing, for example: *I am aiming at the end of the line at bottle 9. I've knocked over the bottle before it too – that was number 8*.

Observe children as they play. Encourage them to describe what they are doing. Use prompts such as: *Only two bottles are still standing. Which ones? Which bottle are you going to aim for next?*

You might set the children challenges such as: *Who can knock over bottle number 7? I wonder if you can knock down bottle 2 without knocking over the bottles next to it. Which bottles are these?*

Encourage children to set each other challenges.

Taking ideas further: Make the equipment available for children to use in their play. Provide resources that they may wish to use, such as a large dice or timers.

Missing number

You will need: number cards 1 to 9 or plastic bottles numbered 1 to 9, pegs and washing line

Show children the shuffled number cards or bottles. Encourage children to explore the numbers. Use prompts such as: *Choose a number you recognise. How do you recognise it? Which numbers are made of a curved and a straight line?*

Explain to the children that you want them to work together to put the cards (or bottles) in order on the washing line. Observe how children do this, noting the number language they use. If necessary, use prompts such as: *Read the numbers you have so far. Are they in the right order? What comes next?*

When they have finished, ask them to count along the line, forwards and backwards, to check that the numbers are in the right order. Explain that you are going to play a game. You will remove one of the numbers and they have to work out which number you have taken. Ask children to close their eyes, then remove a number. When they open their eyes, ask: *Which number is missing? How do you know?* You may need to model, using appropriate language; for example: *Well done, the number 8 is missing. It should be after 7 and before 9*.

Taking ideas further: Children could have their own number track; the first person to point to the missing number could earn a counter. Play 'Number swap', in which you swap two numbers over and children identify the numbers that have been swapped.

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Up my street

You will need: cardboard boxes, art materials, number cards 1 to 9, play cars, play people

Explain that you have some boxes for the children to turn into houses, to make a street. Count the boxes together. Say that each house should have its own number, starting at number 1. Ask: *What will the next number be? What will the biggest number be? Who thinks they can tell us all of the numbers for the nine houses?*

Encourage children to work in groups and suggest that they decorate each house, according to its number; for example, house number 3 might have three windows, three chimneys, three doors… Each group should label their house with its number.

When all of the houses are ready, ask children to put them in order along a road. Observe how children do this, noting the number language they use. If necessary, use prompts such as: *What numbers do you have so far? Are they in the right order? What comes next?* Encourage children to use the 'street' for their play, for example, using model cars and people for role-play. Join in their play to model number language such as: *I am driving to visit house number 7. Where are you going next?*

Taking ideas further: Make the 'street' available for the children to play with inside and out. Make numbered 'letters' for 'postmen' to deliver to the houses.

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Number words and numerals: Phase 4

The main focus in Phase 4 is on extending the range of numbers that children can confidently use, to include zero and numbers to 20. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, order, count, zero, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, first, second, third, forwards, backwards, next, before, between, pattern, sequence, What number comes next? How many…?

Effective practice

- Provide children with daily opportunities to rehearse counting forwards and backwards, using a wide range of contexts and different starting points.
- Pronounce number names clearly, emphasising the word endings, particularly for the '-teen' numbers.
- Help children to recognise patterns within the numbers 0 to 20, for example, through exploring the top two lines of a hundred grid.
- Use and encourage children to use the word *zero* in everyday language, for example, reading out telephone numbers.
- Provide resources children can use to represent numbers within their play.
- Ensure that children have opportunities to hear the number being said, at the same time as seeing the corresponding written number and number word.
- Provide children with models and images showing the sequence of counting numbers, for example, number tracks and number lines.
- Use models such as number tracks to demonstrate how to find the number 'before', 'after' and 'between' given numbers.
- Model how to use knowledge of the counting sequence to identify missing numbers or numbers in the wrong order.
- Ensure that children appreciate that two digits are needed to form the numbers 10 to 20.
- Provide opportunities for children to hear and use ordinal language.

Look, listen and note:

- children's ability to count on or back from different start numbers;
- how well children demonstrate their understanding of the concept of zero;
- how children demonstrate their knowledge of number order, for example, through saying that 12 comes before 13 or ordering the numbers 11, 9, 10, 8;
- children's ability to give the numbers before and after given numbers;
- children's use of the words *first*, *second* and *third* in appropriate contexts.

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Areas of focus for each of the example activities

	Roll the furthest	Sound count	Kim's game	Sit down if…
Page	28	28	29	30
Count forwards and backwards within the number sequence 1 to 20			✓	✓
Order numbers across the 10 boundary (e.g. 8 to 11)			✓	✓
Use zero and the numeral to represent it			✓	✓
Recognise, say and identify numerals 0 to 9 and beyond			✓	✓
Say the numbers that come before and after a given number within the number sequence 1 to 20			✓	✓
Recognise and continue repeating patterns linked to number				
Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts	✓	✓		

	Hopscotch	Teens patterns	Making tracks	Twenty grid
Page	30	31	31	32
Count forwards and backwards within the number sequence 1 to 20	✓	✓	✓	✓
Order numbers across the 10 boundary (e.g. 8 to 11)	✓		✓	✓
Use zero and the numeral to represent it		✓	✓	
Recognise, say and identify numerals 0 to 9 and beyond	✓	✓	✓	✓
Say the numbers that come before and after a given number within the number sequence 1 to 20	✓	✓	✓	✓
Recognise and continue repeating patterns linked to number		✓		✓
Begin to use the ordinal language of 'first', 'second' and 'third' in practical contexts				

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Roll the furthest

You will need: a sloping surface, a box containing objects to roll down the slope, such as toy cars, conkers, cotton reels

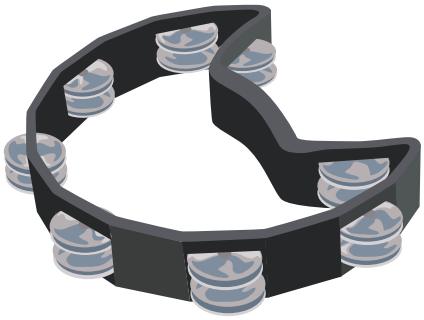
Set up the slope outside so that there is a clear space for objects to roll beyond it. Encourage children to experiment with rolling objects down the slope to see which object rolls furthest. The object that rolls furthest wins.

Encourage children to choose four objects. Prompt children to predict which object will win the race, using ordinal language, for example: *You have chosen a car, a marble and a conker. Which do you think will be first in the race? Which will come second? What about the conker?*

Observe the races and discuss the outcomes with the children. Model the use of ordinal language and listen to how they use it in their comments.

Taking ideas further: Provide three flags labelled 'first', 'second' and 'third' (with '1st', '2nd', '3rd' on the back, as appropriate) for children to label the winning three objects. Make the equipment available for their play.

Sound count



You will need: a variety of musical instruments

Lay the instruments out in front of the children. Ask children to choose an instrument and to use it to make a noise. Talk together about the different sounds that instruments make. Try to ensure that all the children recognise the sounds of the different instruments and know what they are called. It might be helpful to label the instruments. You may wish to model appropriate vocabulary, for example: *The tambourine makes a jangling sound. What about the drum?*

Choose three instruments and explain that you are going to play these three instruments, in turn, and you want the children to listen and remember which instrument you played first, which you played second and which third.

Ask the children to shut their eyes. Make the sounds and put the three instruments down in front of you, but not in the order that you played them. Ask children to open their eyes and talk with a partner to try to agree which instrument was played first, which second and which third. Ask questions such as: *Ruby, tell us what you and Darren thought. Which instrument was third?* Ask successful pairs to explain how they recognised the three sounds and put them in order. Repeat with other examples.

Repeat the activity but, this time, return the three instruments played to the larger set of instruments, so that children have to select the three instruments played, as well as the order.

Taking ideas further: Invite children to take turns to choose and play the three instruments. Make the instruments available for children to use to make group compositions, deciding who will play first, etc.

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Kim's game

You will need: number cards 10 to 20 or 0 to 20

Lay the cards randomly on the ground. Tell the children that you have laid out all of the numbers 10 to 20 (or 0 to 20) on the ground. Ask them to work together to check that they are all there. Observe how they try to do this. You could give some prompts such as: *How could you use counting? Would putting the numbers in order help?*

After counting the cards, in order, together, shuffle them and ask the children to close their eyes while you remove one number. Ask children to open their eyes and look at the remaining numbers. Suggest they work together to try to find which number is missing. Watch how children work, listening to the number language they use.

When children are ready, ask them to say what number they think you removed, before revealing it. Ask successful children to explain how they worked it out. You may wish to describe children's methods yourself in order to model appropriate language, for example: *I heard Ellie and Megan counting up from 0 to 12. Then they said that they couldn't find the next number, 13, which is written with a 1 then a 3, so that must be the missing number.*

Taking ideas further: Remove two numbers at a time. Use a different sequence of numbers, for example, the numbers 8 to 13, without telling the children the range you are using; remove a number from the middle of the sequence.

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Sit down if…

You will need: number cards 0 to 20

Give number cards out randomly, one to each child (or to pairs of children). Ask children to stand in a line, then to read out the numbers in the order they appear, for example: *13, 16, 4, 8, 19, 10, 3, 7, 1, 5...* Ask children to work together to move themselves into the correct order. Observe how they do this. You may need to use prompts such as: *...seven, eight, nine – what comes next? How is the number written?*

Once the children are in the right order, read the numbers together forwards then backwards. Everyone should sit down or stand up when their number is said.

Explain that you are going to make some statements and that children should sit down if the statement is true for their number. Use statements such as:

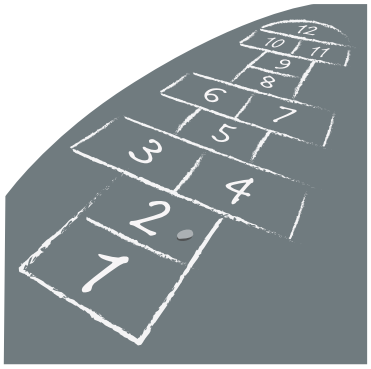
- *Your number comes just after the number 12.*
- *Your number is just before the number 1.*
- *Your number is between 17 and 19.*
- *Your number has a 5 in it.*

For each statement, observe who sits down. Discuss interesting points such as:

- *Why has Josh sat down?*
- *One other number has a 5 in it.*
- *Who can say the name of the number?*

Taking ideas further: Encourage children to make their own number statements. Use a bigger range of properties, such as *Your number is bigger (or smaller) than 12.*

Hopscotch



You will need: a hopscotch grid from 1 to 12 (draw one with chalk if you do not have suitable playground markings), beanbags

Discuss the layout of the hopscotch grid with children, using prompts and questions such as: *Go and stand on a number that you can read. Tell me your number. What number is next to 11? What is the biggest number on the grid?*

Teach children how to play the game by demonstrating or asking older children to demonstrate.

- Players take turns to throw their beanbag, initially into square 1 then moving onto square 2 and so on if they are successful.
- For each number, players must throw the beanbag onto the appropriate square so that it is not touching any of the edges of the square.

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- If they miss, their turn ends. If they manage it, the player hops along the grid, stopping just before the beanbag, leans over to pick it then continues to the end of the grid and back.
- If they touch a line, or fall over at any point, their turn ends.

Play with children, encouraging them to talk about what they are doing as they play. Use prompts such as: *Shami's beanbag has landed on the number 3. What number will he stop on to pick it up?*

Taking ideas further: Change the rules so that children stop to pick up the beanbag on the way back. Encourage children to make up their own games to play, using the hopscotch grid; provide equipment they may wish to use such as dice, chalk or counters.

Teens patterns

You will need: digit stamps, paints and long strips of paper, a number track or line

Count with the children from 10 to 20 as you point to each number on a track. Ask them to focus on the '-teen' numbers. Use prompts such as: *Tell me some of the numbers that have '-teen' in them. How are these numbers written? Can you spot the pattern?* (They are written using 1 and another digit.)

Invite children to print their own number track to help them count from 10 to 20. Create your own number track alongside the children, so that you can observe them and talk with them about what they are doing. Encourage children to discuss the patterns in the digits they use. Prompt them with questions such as:

- *I am going to print the number 14 next. Who has the stamps that I need?*
- *What number are you going to print next? What stamps will you need?*
- *Which stamp are you using most often? Can you see any patterns in the stamps you need?*

Taking ideas further: Encourage children to use their number tracks to play games, using dice and counters. Make a display to show how the numbers 10 to 20 are written. Make up a rhyme or poem to help children to remember that the '-teen' numbers are written with a 1 then another digit.

Making tracks

You will need: number cards 0 to 20

Invite a small group of children to play this game. Explain that it involves putting the numbers 0 to 20 in order, so you are going to practise counting to 20 together before you start to play. Mix the number cards up on the floor. Ask a child to find the number 10 then encourage the children to work together to create the sequence of numbers by working forwards and backwards from the number 10. Use prompts and ask questions such as: *Which number comes before 10? Which number comes after 10? Let's read the number sequence so far. Which numbers do we need now?*

When the number track from 0 to 20 is complete, use it to rehearse counting to 20 and back and to think about the numbers to 20. Ask questions such as: *What is the smallest number in the sequence? What is the largest number in the sequence? Where can you see the pattern zero, one, two, three…? What number comes just before 12? What number comes just after 12?*

Play the game with children. Deal out the cards. Whoever has the number ten puts this down first. Play moves clockwise. The next person can add to the sequence already on the floor only by playing the number before or the number after. If they don't have either of these numbers, they miss their go. Encourage children to explain their reasoning by modelling appropriate language, such as: *So far we have eight, nine, ten, eleven. The number before eight is seven. The number after eleven is twelve. I don't have these numbers so I can't go.* Continue playing until someone has played all of their cards.

Taking ideas further: Make number cards available for children to use in their play. Encourage them to make up their own games: provide dice and counters.

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Twenty grid

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19

You will need: grid with two rows and ten columns (chalked on the ground or made using tape on a carpet); number cards 0 to 19

Place 0, 19 and a few other numbers appropriately in the grid (as in the top two rows of a 0 to 99 grid) and the rest randomly around the outside of the grid. Explain to the children that the numbers 0 to 19 need to be put into the grid in order. Ask them to work together to try to do this. Observe how they work and listen to the number language they use. You may wish to use prompts and questions such as: *What number do you think comes next? Which number goes before 19?*

When all of the numbers are in place, discuss the patterns that can be seen in the number grid. Use prompts and questions such as:

- *Where can you see the sequence 1, 2, 3…? Is this the only place?*
- *What number is underneath 4? What is the same about 4 and 14?*
- *What do you notice about the numbers in the second row?*

Taking ideas further: Make the grid, dice and counters available for children in their play.

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Number words and numerals: Phase 5

Phase 5 focuses on extending the range of numbers that children can confidently use, to include numbers to 30. Children also start to explore the sequences of numbers when they count from zero in twos, fives and tens. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, order, count, pattern, zero, twenty-one, twenty-two…, twenty-nine, ten, twenty, thirty, forty, fifty, sixty, seventy, eighty, ninety, one hundred, forwards, backwards, next, before, between, sequence, first, second, third, fourth, fifth… What number comes next? How many…? What order…?

Effective practice

- Provide children with daily opportunities to rehearse counting forwards and backwards using a wide range of contexts.
- Provide children with models and images showing the sequence of counting numbers, for example, number tracks and number lines.
- Use models such as number tracks to demonstrate how to find the numbers before, after and between given numbers.
- Use a hundred grid to explore the patterns in the numbers 1 to 30 and the patterns when you count in twos, fives and tens.
- Count in twos, fives and tens, encouraging children to use the patterns to join in the count.
- Provide opportunities for children to hear a number being said, at the same time as seeing the corresponding written number and number word, to make the connection between the three forms.
- Give children opportunities to see a number name linked to a set of objects in which the objects are grouped into tens and ones, so that they begin to understand place value in numbers to 30.
- Use real-life opportunities to model ordinal language, for example, discuss who is fourth, fifth… in a queue.

Look, listen and note:

- the sequences of numbers that children recite accurately, in different contexts;
- how securely children join in a count from zero in twos, fives and tens;
- the numbers to 30 that children can read and recognise in numeral form;
- children's ability to say the numbers before and after given numbers;
- children's use of ordinal language such as *first*, *second*, *third* and *fourth* in appropriate contexts.

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Areas of focus for each of the example activities

	Circle swap	What's the date?	Pass the teddy	Counting coins
Page	35	35	36	36
Count forwards and backwards within the number sequence 0 to 30	✓			
Count forwards in twos, fives and tens			✓	✓
Recognise, say and identify numerals up to 30	✓	✓		
Say the numbers that come before and after a given number within the number sequence 0 to 30	✓	✓		
Identify and explain simple patterns in the number sequence			✓	
Use the language of ordinal numbers in a range of contexts	✓	✓		✓

	Printing numbers	Musical numbers	Number grid	Matching bracelets
Page	37	37	38	38
Count forwards and backwards within the number sequence 0 to 30	✓	✓	✓	
Count forwards in twos, fives and tens			✓	
Recognise, say and identify numerals up to 30	✓	✓	✓	
Say the numbers that come before and after a given number within the number sequence 0 to 30	✓	✓	✓	
Identify and explain simple patterns in the number sequence			✓	
Use the language of ordinal numbers in a range of contexts				✓

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Circle swap

You will need: number cards 0 to 30

Ask the children to sit in a circle and explain that you want them to say the numbers on the cards, as you hand them out round the circle. Make sure that the cards are roughly in order, but with some numbers swapped around, for example: *10, 11, 12, 14, 13, 15, 16, 19, 18, 17, 20…* Walk around the circle handing out the cards.

Ask children to count with you around the circle*: zero, one, two, four, three…* Pause where the numbers are muddled, to encourage children to comment. If no one does, you might need to model your thinking: *Hmm, that doesn't sound quite right. There is something wrong with these numbers. Who can tell us what it is?* Ask children to suggest who needs to swap places to make the counting sequence correct. Carry on around the circle, encouraging the children to put their hands up when there is a problem and explain who needs to move to put it right.

When the numbers are in order, count round the circle forwards and backwards. Encourage children to look closely at the sequence. Use prompts and questions such as:

- *What number comes before 24? How do you know that?*
- *I wonder how many numbers in the circle contain the digit 2. How could we find out?*

Explain that you are going to say pairs of numbers and that the children holding those cards should swap places. Once the numbers are mixed up, explain that you are going to try to count from 0 to 30 with each child saying their own number at the appropriate time. Ask: *Who is going to go first in our counting sequence? Who will be second? Who will be third?* Start the sequence. If the count gets stuck, give prompts to find the next number, such as: *The last number in our count was 21. What comes after that? What does the number 22 look like?*

Taking ideas further: Count round the circle, asking every second, fifth or tenth child to stand up, look for patterns in the numbers and say the sequence together.

What's the date?

You will need: two sets of number cards 0 to 9, cards showing each day of the week and month of the year, a date display

Regularly spend a short time with children, discussing the date. Each day, lead a brief discussion using prompts such as: *Who can read yesterday's date? Today's date will be the next number. What is this? How is that number written? Who wants to come and change the digit(s)?*

Help children to begin to understand that we use the ordinal numbers first (1st), second (2nd), third (3rd)… to describe the date. As well as changing the number of the date, say the date together, for example: *Today is Thursday the fifth of June.*

Taking ideas further: Build in opportunities to rehearse the sequence 0 to 31 and the sequences of days of the week and months of the year. Include questions such as: *What date was it on Monday? What day will the seventh be?*

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Pass the teddy

You will need: a teddy, a hundred grid

Ask children to stand in a circle. Explain that you are going to count in tens to 100. Ask children to join in the count with you, pointing to each number on the hundred grid as you say it.

Lead a discussion about the patterns in the multiples of ten. Use prompts such as: *What helps you to remember the numbers when you count in tens? Where are the tens numbers in the hundred grid? What patterns can you see in the tens numbers? What number is after 40 when you count in tens?*

Explain that the children are going to pass the teddy round the circle, while counting in tens. The person holding the teddy when the count reaches 100 sits down. Start again, continuing until there is only one person left standing.

Taking ideas further: Count in twos or fives in a similar way, with children sitting down if they are holding the teddy when the count reaches 20 or 50.

Counting coins

You will need: 10p coins, a dice or a spinner marked 0p and 10p (three of each), purses or drawings of purses

Explain that you are going to play a game in which you count 10p pieces until you get to 100p. Practise this together, going round the group and adding 10p into a purse each time, counting up in 10s as you go: *10p, 20p, 30p…*

Reinforce children's understanding of counting in tens, asking questions such as:

- *How much money would you have if you have three 10p pieces? How do you know?*
- *If I want 50p, how many 10p pieces would I need?*

Place a pot of 10p coins in the middle of the floor or table. Explain the game. Let children take turns to roll the dice. If they roll *10p*, then they take a 10p piece and put it in their purse. Ask children what they think happens if they roll *0p*. As each person gets to 100p, they stop playing.

Play the game with the children. Model the use of number language as you play, for example:

- *I have 20p in my purse and I've just rolled another 10p. That makes 30p so far.*
- *How many 10p coins do you have? How much money is this?*
- *Who has the most money at the moment?*

At the end of the game, talk about who finished the game first, second, third…

Taking ideas further: Play a similar game, using 2p coins, in which children race to get 20p, or 5p coins, where they race to get 50p. Provide regular opportunities for children to use money as part of their everyday counting. Provide money for children to use within their own play.

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Printing numbers

You will need: number stamps 0 to 3, paint and paper

Show children the number stamps. Explain to them that you would like them to use the stamps to print some numbers they know.

Work alongside children, printing numbers, so that you can observe them as they work and discuss what they are doing. Model number language by 'thinking aloud', for example: *I am going to print 2 and then 2 again. This makes the number 22. The number after 22 is 23 and I can print that number as well. What number are you going to print next? What digits do you need to use?*

Encourage children to explore how many different numbers they can print, using the number stamps 0, 1, 2 and 3. Talk with children about the numbers they have printed:

- *How many different numbers have you printed?*
- *Can you read me your numbers?*
- *You have printed the number 12. Can you print the number that comes before 12 and the number that comes after 12?*

Taking ideas further: Increase the range of number stamps that children have access to, for example, 0 to 4 or 1 to 5.

Musical numbers

You will need: a CD player, a number track 0 to 30 chalked on the ground, with a few numbers missing

Ask children to help you complete the number track. Use prompts and questions, such as:

- *What number should be before 26? How do I write this number?*
- *Who can identify other numbers that are missing?*
- *How did you know that the number 13 belongs in this space?*

Encourage children to jump along the number track, saying the number they land on each time.

Invite a group to play 'musical numbers'. Explain that while the music plays children should dance around the number track. When it stops you will ask them to find a special number, for example, a number that contains the digit 2, a number that is bigger than ten, a number we say when we count in tens. Only one person can choose each number. If a child has no number, they sit out and help you check that children have found suitable numbers.

During the game, involve the children who are watching by asking questions such as: *Amy needs to find a number that contains the digit 2. What numbers are left for her to choose?*

Taking ideas further: Encourage children to make up their own number statements. Make the equipment available for children's own play.

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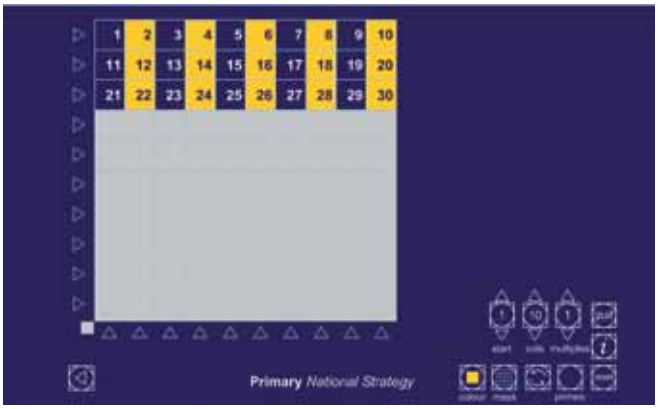
Number grid



You will need: *Number grid ITP*, interactive whiteboard

Display *Number grid ITP* on the interactive whiteboard. Click twice on the small square at the bottom left corner of the grid, to show white, then click on arrows pointing to the bottom seven rows of the grid to mask them. Select the colour button and click on some of the 1 to 30 number squares so that some of the numbers are hidden.

Ask children to look at the top three rows of the grid and describe what they see. Talk about the missing numbers: *Can anyone suggest any of the numbers that are hidden? How did you work this out? What patterns did you use?*

Reveal the numbers by clicking on them. Ask a child to point to each number as you count together, from 1 to 30 and back again. Change the colour button to yellow. Explain that you are now going to use the grid to help you count in twos. Model counting, pressing every second number to colour its square yellow. Ask a child to carry on the pattern. Together, say the sequence of yellow numbers: *Two, four, six*... Encourage children to talk about the patterns they notice.

Taking ideas further: Use the grid to support counting in fives and tens in a similar way.

Matching bracelets

You will need: laces, an assortment of beads

Invite children to use laces and 20 beads to make bracelets. Talk briefly about the different sorts of beads there are. Show children a bracelet you have made. Explain that you are going to describe the bracelet so that they can make matching ones. Hide your bracelet from them and describe it, modelling the use of ordinal language: *The first bead in my bracelet is a small yellow cube. The second bead is round, big and green. The third is…*

When you have finished your description, ask children to hold the bracelets up to see whether your description helped everyone to make matching bracelets.

Encourage children to complete a bracelet, saying: *I want your 11th bead to be yellow and your 15th to be red*. Ask children to describe to their partner the bracelet they have made, to see whether they can make a matching bracelet without seeing the original. You may wish to offer prompts to support children's description, for example:

- *What sort of bead did you use first?*
- *Describe the fifth bead.*

Taking ideas further: Encourage children to make bracelets or necklaces, using repeating patterns, and to describe and continue each other's patterns.

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Number words and numerals: Phase 6

Phase 6 focuses on extending the range of numbers that children can confidently use, to include numbers to 100. Children also become more secure in counting forwards and backwards in twos, fives and tens. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number, count, pattern, forwards, backwards, next, before, between, sequence, number names to 100, multiple

What number comes next? What is the number before...? Count in twos, fives, tens.

Effective practice

- Provide children with daily opportunities to rehearse counting forwards and backwards, using a wide range of activities.
- Count forwards and backwards from different points in the number sequence.
- Count forwards and backwards in twos, fives and tens, using visual models such as socks, fingers and coins.
- Provide children with models and images showing the sequence of counting numbers, for example, number tracks, number lines and hundred grids.
- Use number tracks and lines to demonstrate how to find the numbers before, after and between given numbers.
- Use a hundred grid to explore the patterns in the numbers 1 to 100 and the patterns when you count in twos, fives and tens.
- Provide opportunities for children to hear a number being said, at the same time as seeing the corresponding written number and number word, to make the connection between the three forms.
- Give children opportunities to see a number name linked to a set of objects in which the objects are grouped into tens and ones, so that they begin to understand place value in numbers to 100.

Look, listen and note:

- the sequences of numbers that children recite accurately in different contexts;
- how securely children join in counting in twos, fives and tens, forwards and backwards;
- the numbers to 100 that children can read and recognise in numeral form;
- children's ability to give the numbers before and after given numbers.

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Areas of focus for each of the example activities

	Forwards and backwards	Hundred-grid jigsaw	What's in the line?	Shade the squares
Page	41	41	42	42
Count forwards and backwards within the number sequence 0 to 100	✓	✓	✓	
Count forwards and backwards in twos, fives and tens			✓	
Recognise, say and identify numerals 0 to 100	✓	✓	✓	✓
Say the numbers that come before and after a given number within the number sequence 0 to 100	✓	✓	✓	✓

	Building blocks	High and low	My number	Keep fit
Page	43	43	44	44
Count forwards and backwards within the number sequence 0 to 100	✓	✓	✓	✓
Count forwards and backwards in twos, fives and tens	✓	✓		
Recognise, say and identify numerals 0 to 100			✓	✓
Say the numbers that come before and after a given number within the number sequence 0 to 100			✓	

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Forwards and backwards

You will need: number cards showing random two-digit numbers, a tambourine

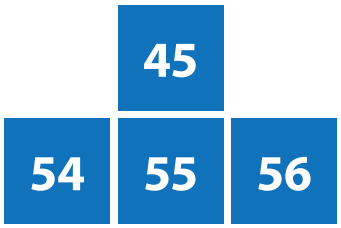
Explain that you are going to play a game that involves counting to 100 so to warm up you will count forwards and backwards from different numbers. Say that you are will start counting and that they should join in as soon as they can. When you tap the tambourine, you will change the count. Lead the count forwards and backwards from a range of numbers: *30, 31, 32, 33, 34, 35... 89, 88, 87, 86, 85... 13, 14, 15, 16, 17...*

Place five two-digit number cards in a line. Read the numbers together, for example: *42, 27, 35, 18, 25*. Explain that you are going to count together from one number to the next and that children should think hard about whether they need to count forwards or backwards each time. Help them prepare for the activity, using prompts such as: *The first number is 42 and the second is 27. I wonder whether we will have to count forwards or backwards to get from 42 to 27. How can we tell?*

When you have counted along the numbers, talk with the children about the count. Use prompts such as: *What was the biggest/smallest number we counted to? Which numbers did you find easy/hard to count from?*

Taking ideas further: In a similar way, give every child in a circle a number and count around the circle; ask children to choose their own two-digit number.

Hundred-grid jigsaw



You will need: a hundred grid copied onto card and cut along grid lines to form jigsaw pieces of different shapes

Explain that you have a jigsaw to try. Encourage children to spread the pieces out. Lead a discussion about what they can see. Use prompts such as: *What can you see on the pieces? Look at the numbers on this piece. I wonder how they are arranged. What do you think this jigsaw might look like when it is complete?*

Encourage children to start to put some pieces of the jigsaw together. Observe and listen to how they go about this. Encourage children to talk about the decisions that they are making. Use prompts and questions such as: *What numbers can you see on this piece? Which numbers do you think should be next to these? What are you looking for next?* If children are not familiar with a hundred grid, you may wish to have one nearby that they can refer to.

Once the jigsaw is complete, ask children to describe some of the patterns that they can see in the hundred grid. Encourage children to count up and down a column and ask them questions such as: *What is the same? What is different as you count up and down?*

Taking ideas further: Provide hundred grids on different colour card that children can cut into their own jigsaw and swap with a friend. Provide hundred grids containing some blanks for children to complete.

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What's in the line?

You will need: number cards 0 to 100 or blank cards to write on, a counter

Use cards showing a sequence of six numbers that go up or down in ones, twos, fives or tens. Place them face down in a row on the floor or table, without children seeing the numbers. Ask a child to turn over the first card. Encourage children to talk about what numbers could be on the remaining cards. You might use prompts such as: *What number do you think will be on the second card? Why do you think it might be that number? Who thinks the same? Who has a different idea?*

Ask someone to turn over the second card. Discuss whether any of the suggestions were right. Encourage children to make suggestions about the rest of the cards, for example, children might say that they think they know the number of the third card or suggest a rule such as: *The numbers go down in ones*. Check children's predictions by turning over the third card. Put a counter on the last card and ask children to work out what they think the number on that card will be. Share ideas, encouraging children to give their reasoning. Once all suggestions have been made, turn over the remaining cards. Read along the sequence and discuss the patterns in it. Use prompts such as: *What patterns can you see in the last digit of each number?*

Repeat the activity with different sequences. Place a counter on the card about which you would like children to make predictions and reveal two of the other cards.

Taking ideas further: Encourage children to make up their own sequences to use in the activity, using number tracks or a hundred grid.

Shade the squares

You will need: hundred grids copied onto paper, coloured pencils

Invite children to colour cells on a hundred grid to make a pattern. Do the activity alongside the children so that you can model the use of mathematical language and encourage them to talk about what they are doing. Use prompts such as:

- *I am colouring in the line of numbers from 51 to 60 red.*
- *Which square are you going to colour next?*
- *You have coloured 51, 52, 53 and 54. What is the next number you will colour?*
- *Is there any pattern in the numbers you have coloured blue?*

When children have finished their patterns, encourage them to work with a partner. One person should hide their pattern and describe which squares their partner should colour. They then check how good the description was by comparing the patterns.

Taking ideas further: Provide images that involve numbers, such as number tracks and hundred grids, for children to use in their own play.

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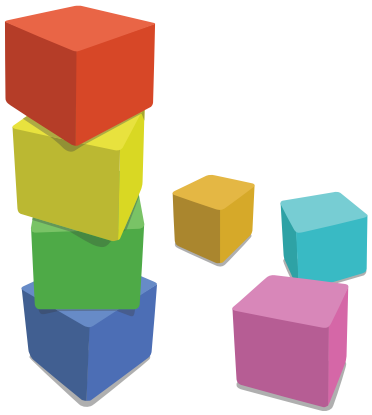
Building blocks



You will need: building blocks, a minute timer

Challenge the children to build the tallest tower that they can, using building blocks, in one minute. Before they start, ask them to predict how many bricks they will use. Set the minute timer.

When the minute timer runs out, ask children to count how many blocks there are in their towers. Encourage them to think about the outcomes. Use comments and prompts such as: *Whose tower has most building blocks in it? How do you know? Did you manage to put more or fewer blocks in your tower than you predicted?*

Try the activity again but explain that, this time, each block counts as 2, 5 or 10 points. Count together in twos, fives or tens to help children make their predictions. At the end of a minute, children should count in twos, fives or tens to work out the value of their tower and compare their scores with each other.

Taking ideas further: Encourage children to predict and then count how many times they can perform other actions in a minute; for example, jumping on the spot, rolling a 6 on a dice or writing their name. Score, 2, 5 or 10 points for each action.

High and low

You will need: a hundred grid

Ask children to sit in a semi-circle so everyone can see you. Explain that you are going to count together and put some actions to your counting.

Initially, count together in ones from 0 to 30 and back to 0. Explain that now you are going to put actions to the count. Practise the actions together, alternately putting hands down on your lap and raising hands high in the air. Next, put this together with the count, hands high for zero, low for one, high for two… Ask children to think about the count, with questions such as: *Was the number five high or low? What about eight? Which numbers do you remember that are 'high' numbers?* Write down the children's suggestions and repeat the activity to see which suggestions are correct.

Explain that you are going to do this count again but that you are going to hold the 'down' numbers in your head, not say them aloud. Lead the count: *Zero, two, four…* Ask children to repeat the count while you underline the spoken numbers on a hundred grid. Ask questions to encourage children to consider the numbers in the count; for example: *What patterns can you see in the underlined numbers? Do you think that the number 100 would be a 'high' number? How do you know?*

Repeat the activity, counting forwards and backwards from different even start numbers.

Taking ideas further: Lead a similar counting activity counting in fives from zero. Discuss the patterns in the 'high' and 'low' numbers.

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My number

You will need: number cards to 100

Explain that you are going to play a guessing game with numbers to 100. Warm up by counting together, forwards and backwards, from various starting numbers. Take a selection of two-digit number cards and place them face up on the table or floor. Explain that everyone is going to choose a number that they recognise, then give clues to help everyone else guess their number.

Take the first turn yourself to model some of the number language that children might use, for example: *My number has a 2 in it. It is bigger than 50. It is smaller than 60.* Encourage children to have a guess after each clue until they guess correctly.

Ask children to take turns choosing a number and giving clues. Observe and listen to the number statements children make. Offer prompts and questions to the children who are guessing, such as: *Is there more than one number we can see that fits that clue? Which numbers in the set are bigger than 50?*

You may wish to use a hundred grid to help identify possible numbers after each clue is given.

Taking ideas further: Play 'five questions' – challenge children to try to find out the number you or someone else is thinking of within five questions.

Keep fit

You will need: PE equipment such as ropes, balls, a bench…, a two-minute timer

Set up different PE activities around the hall or the outdoor area so that there is one activity for each group of about six children. Activities might include:

- bunny hopping from one side of a bench to the other;
- bouncing and catching a ball;
- skipping.

Organise children into groups. Explain that they are going to do lots of different activities for two minutes each. Ask a child to demonstrate each activity and practise counting how many actions they do in two minutes.

Before children start each new activity, ask everyone to think about how many skips, jumps, throws… they think they will do in two minutes and to tell a friend their estimate. At the end of two minutes, ask children to think about the number of actions they managed. Use prompts such as: *Who did more actions in two minutes than they thought they would? Tell us how many actions you thought you might do and how many you did, Amanda. In Paul's group, who completed most skips?*

Taking ideas further: Make timers available for children to use as part of their play. Encourage children to make other estimates, based on how many of a certain type of activity they can do in a set time.

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Counting sets: Phase 1

Phase 1 focuses on the development of children's early awareness of quantity. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

more, less, few, more than, less than, fewer, fewer than, number, one, many, lots, lots of, a few, a lot, How many...?

Effective practice

- Model the language used to describe one-to-one correspondence, for example: *One piece of fruit for me, one for you, one for Ellie...*
- Look for opportunities to develop children's sense of one-to-one correspondence, for example, laying a table for the three bears, with a plate for each of them, a cup for each of them... as part of a *Goldilocks and the three bears* role-play.
- Look for opportunities to talk about quantity in different contexts. Children need to hear the vocabulary of quantity, such as 'lots' and 'few', in a variety of relevant contexts, to begin to appreciate their meaning.
- Model how to describe the quantity of objects in a set by 'thinking out loud', using vocabulary such as 'one' and 'more'.
- Maximise opportunities for children to use their emerging vocabulary for quantity, for example, by providing appealing containers and sets of objects for them to use in play.
- Help children to develop a sense of quantity through contexts that are relevant to them, for example, inviting them to take one piece of fruit at snack time.
- Draw attention to differences in quantity, for example, commenting that Sam has chosen to put more raisins on his biscuit than Megan has put on hers.
- Provide children with examples of direct comparison of quantities, for example, holding two strings of beads up alongside each other to decide which has more beads.
- Model the use of the vocabulary of comparison, such as: *Rakesh has more bricks in his tower than Ben does. Ben has fewer bricks than Rakesh.*

Look, listen and note:

- how well children demonstrate an understanding of one-to-one correspondence;
- children's spontaneous descriptions of quantity;
- children's ability to identify sets containing 'only one' object and those containing 'more than one';
- how well children compare two different quantities and the language that they use.

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Areas of focus for each of the example activities

	Teddy's tea party	Greedy puppet	Some favourite things	One bear all alone
Page	47	47	48	48
Show awareness of one-to-one correspondence through practical everyday experience	✓	✓	✓	
Distinguish between quantities, recognising when a group of objects is more than one		✓		✓
Begin to make comparisons between quantities				✓
Use some number language, such as 'more' and 'a lot'	✓	✓		✓

	Coloured towers	Threading beads	Feely socks	Lucky dip
Page	49	49	50	50
Show awareness of one-to-one correspondence through practical everyday experience	✓			
Distinguish between quantities, recognising when a group of objects is more than one	✓		✓	✓
Begin to make comparisons between quantities	✓	✓	✓	✓
Use some number language, such as 'more' and 'a lot'	✓	✓	✓	✓

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Teddy's tea party

You will need: teddy bears, a small table and chairs, sets of party items, such as hats, plates, cups, saucers, knives

Set up a table in the role-play area and make the equipment available for children to organise and role-play their own teddies' tea party.

Observe and listen to children as they play, taking particular note of any language they use spontaneously to describe number or quantity. Use suitable opportunities to model mathematical language through describing children's actions, for example: *I can see that you are giving the bears a cup each – one for the big bear, one for the yellow bear...*

Encourage children to vocalise what they are doing, using prompts and questions such as:

- *You have given each bear a cup. What are you going to do next?*
- *Are there enough knives on the table? How can we find out?*
- *Can this little bear join the tea party? What will you need to do?*

Taking ideas further: Make the equipment available for children in their play. Link the equipment to stories such as *Goldilocks and the three bears*, to encourage children to retell or act out the story.

Greedy puppet

You will need: a hand puppet, snacks such as raisins

Invite children to share a treat of raisins with you. Explain that the puppet is allowed a treat too, because he has been very good today. Explain that there are enough raisins for everyone to have one each. Ask the children to use their fingers to show the puppet how many raisins he is allowed.

Ask one of the children to take the bag around the group so that everybody can have one raisin. As children take their treat, model the use of mathematical language to describe one-to-one correspondence, for example: *...one for David, one for Poppy, one for Jack...* Invite children to join in this description.

When the child comes to you, make the puppet grab several raisins and, if the children don't spontaneously comment, offer a prompt such as: *Oh no, what has the puppet done?* Give the children time to offer their explanations. You may wish to model the use of particular vocabulary by making comments such as: *Yes, he has taken too many raisins. He has taken more than one.*

Ask the children to suggest what the puppet should do to put the situation right and follow their suggestions.

Taking ideas further: Make puppets available for children to use within their play. Look for other opportunities in everyday activities to model the language to describe one-to-one correspondence.

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Some favourite things

You will need: plastic pots, bottle-tops, thick cardboard, glue, selection of 'favourite' objects

Explain to children that you have made a special display tray that shows some of your favourite objects from around the building. Show children your collection, or one that another child has made. Lead a discussion about the collection, using prompts such as: *What objects can you see in the collection? Is there an object that you really like in this collection?*

Encourage children to make their own 'favourite things' display trays. Allow them to choose from a range of resources such as thick cardboard and a selection of plastic pots and bottle-tops that they can stick on to it, to make containers for their favourite things.

When their display trays are dry, encourage children to walk around the building, indoors and outdoors, to find some objects that they really like. Explain that they should take only one of each object and that they need to find enough objects to have one in each pot or bottle-top in their tray.

If possible, walk around with children as they choose, observing how they place the items. Encourage children to discuss their choices, using comments and questions such as:

- *You have chosen one of the finger puppets. Which container are you going to put it in?*
- *You only have one small bottle-top left. I wonder what you will choose to put into that.*

Taking ideas further: Encourage children to show and discuss their collections with other children. Make a display of 'favourite things'.

One bear all alone

You will need: small plastic bears or other objects, opaque plastic cups or bowls

Place three or four bowls upside down on a table. Place a single bear under one of the bowls and different quantities of bears under the others.

Invite children to help you. Tell the children that you are looking for the lonely bear, the one all on its own. Ask the children to take turns to turn over a cup or dish, encouraging them to describe what they have found. Use prompts and questions such as: *Tell us what you have found. Have you found one bear or more than one?*

Encourage children to take the bears that they find and to place them in a line in front of them. Prompt children to compare the number of bears that they have, by asking questions such as: *Do you think that Max or Evie found more bears? How could we check?*

Invite the children to play again by placing their bears back under a cup. The child who found the lonely bear could mix the cups around before you play again.

Taking ideas further: Provide appealing objects and containers for children to use in their play. Ensure that you provide some containers with lids to encourage children to guess which or how many objects may be inside.

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Coloured towers

You will need: different-coloured building blocks (the same shape), a dice with coloured stickers to match the colours of the blocks

Invite children to build some towers with you. Explain that you would like to make some different-coloured towers. Show children the box of blocks. Explain: *We can make a red tower. What other colour towers can we make?*

Show children the dice and explain that you are going to take turns to roll it. If you roll a red then you take a red block and add it to the red tower. Take part in the activity, alongside the children, so that you can model the use of the language of quantity through descriptions and prompts such as:

- *Which tower do you think has most bricks?*
- *I have rolled a blue, so I am going to put one more blue brick on top of the blue tower. The blue tower has lots of bricks in it now. Is there another coloured tower that has more bricks?*

Carry on the game, discussing the outcomes until one tower falls over. As towers get taller, discuss with children which tower they think may fall over first, and why.

Taking ideas further: Provide equipment such as dice and spinners that children can build into their own play. Play a similar game, with a second dice showing small numbers.

Threading beads

You will need: laces of different lengths, beads or other objects to thread, plastic pots or bowls

Invite children to join you in threading beads on laces. Explain that each child should choose which lace they want to start with. Choose a lace yourself and make a prediction about the beads you think will fit on it, modelling your mathematical thinking aloud, for example: *I think I will only get a few beads onto this lace because it is quite short. What about your lace?*

Give each child a bowl and encourage them to take as many beads or objects as they think they will be able to place on their string and place them in their bowl. Encourage children to discuss what they are doing. Use prompts such as: *Have you taken just a few beads or a lot of beads? Who do you think has taken the most beads?*

As you thread your beads, model your thinking, making comments such as: *My lace is nearly full and I still have lots of beads left in my pot. I think I took too many beads. What about you, Rhys?*

When children have finished threading their laces, encourage them each to hold up their lace next to another child's and make comparisons. Use prompts such as: *Whose lace do you think has more beads on it? Why do you think that?*

Taking ideas further: Display the laces and talk about the display. Ask questions such as: *Which lace has only one red bead on it? Whose lace has most beads?*

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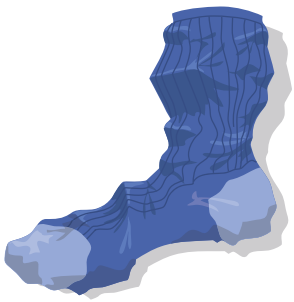
Feely socks



You will need: socks or small cloth bags, beads, interesting objects that can be clearly felt through the fabric, a hoop

Place single items into some of the socks and multiple items into others. Make the socks available for children to use in their play. Explain to children that you are trying to sort the socks so that all socks that contain only one item go in the hoop (on the ground). Encourage children to pick a sock and describe what they can feel inside it. Suggest that they hand it around for everyone to feel and talk about. Listen to the mathematical language that children use, especially the language they use to describe the quantity of objects they can feel. Take a turn yourself to model the use of appropriate language, for example: *I can only feel one object. It feels like it has lots of spikes.*

When all the children in the group have felt and described a sock, encourage them to decide whether it should go in the hoop or not. After all of the socks have been placed, encourage children to empty the socks, one at a time. They remove the objects and place them on the sock, each time. Encourage children to discuss whether their predictions were correct and what each sock did contain. Use prompts such as:

- *We thought that this sock contained only one object. Were we right?*
- *Which socks had more than one object in?*
- *Which sock do you think had the most things inside it?*

Taking ideas further: Make the socks and sets of appealing objects available for children to use in their own play and games. Encourage children to place objects in the socks for other children to feel and guess.

Lucky dip

You will need: plastic or cloth bags, small items of interest to the children, a cardboard box with a hand-hole cut out

Place single objects into some of the bags and several objects into others. Tie them up loosely and place them into the lucky-dip box. Invite children to take turns to have a dip. As each child picks a bag, ask them to take the objects out, place the objects in front of them and describe what they find. Take your own turn so that you can model the use of language to describe quantity, for example: *In my bag there are lots of marbles. They are very hard.*

When all the children in the group have picked a bag, encourage them to compare the contents of their bags. Use prompts and questions such as:

- *Emma's bag had only one object in it.*
- *Did anyone else's bag contain more objects than Sarwan's?*
- *Which bag had lots of stars in it?*

Taking ideas further: Make the lucky-dip box available for children to use in their play. Encourage them to choose some favourite objects to place in the box.

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Counting sets: Phase 2

Phase 2 focuses on the development of children's ability to count up to five objects and to recognise, without counting, sets of one, two or three objects. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

one, two, three, four, five, number, count, more, less, few, more than, less than, least, fewer, amount, the same as, How many...?

Effective practice

- Look for everyday opportunities to model the language and actions involved in counting small groups of objects.
- Share with children real-life examples in which counting helps with organisation. Make this clear to the children by 'thinking aloud'.
- Help children to learn the counting sequence one to five securely before expecting them to count objects accurately.
- Model strategies that help to ensure children count one number for each object and then provide opportunities for them to rehearse these strategies.
  - Touch each object as you count it.
  - Move objects from one location to another, for example, counting each object as you remove it from a feely bag and place it on the table.
  - Place objects in a line, in order to count them accurately.
  - Once children can recognise the numerals, count objects by placing them along the cells of a 1 to 5 number track.
- Help children to develop a sense of quantity through contexts that are relevant to them, for example, asking them to find their two shoes.
- Encourage children to compare numbers in different sets.
- Provide opportunities for children to use visual images of sets of one, two and three objects, including dotted dice and dominoes as well as dots placed in unfamiliar arrangements.

Look, listen and note:

- situations in which children spontaneously try to count objects in a set;
- how children respond to questions in which they are asked to count objects in a set;
- the strategies that children use to support accurate counting of a set of objects;
- which numbers, to five, children can show on their fingers;
- children saying that there are one, two or three objects, without counting;
- children identifying two sets that contain the same number of objects (one to three).

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Areas of focus for each of the example activities

	Finger rhyme	Painting time	Wash day	Eyes shut
Page	53	53	54	55
Appreciate that numbers can identify how many objects are in a set	✓	✓	✓	✓
Count up to five objects by touching each object and saying one number name for each item		✓	✓	✓
Know that the last number in the count gives the total	✓	✓	✓	✓
Represent numbers up to five, using fingers	✓			
Recognise groups with one, two or three objects			✓	
Match groups with the same number of objects (one to three)				

	Puppet counting	One, two or three?	Find five	Bug pelmanism
Page	55	56	56	57
Appreciate that numbers can identify how many objects are in a set	✓	✓	✓	✓
Count up to five objects by touching each object and saying one number name for each item	✓		✓	✓
Know that the last number in the count gives the total	✓		✓	✓
Represent numbers up to five, using fingers			✓	
Recognise groups with one, two or three objects		✓	✓	✓
Match groups with the same number of objects (1 to 3)		✓		✓

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Finger rhyme

You will need: number rhymes suitable for counting to five on your fingers, for example, *Five little birds*

Explain to children that you are going to use your fingers to count to five. Ask children to watch your fingers as you raise them, one by one, while counting to five. Encourage children to join in the counting and the actions. Explain to the children that you need their help with a suitable number rhyme, for example, *Five little birds*.

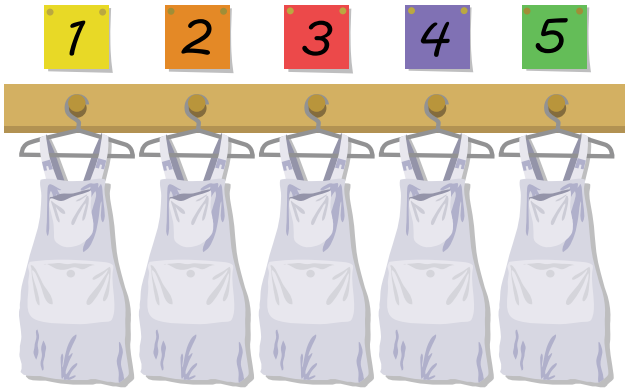
One little, two little, three little, four little,
Five little birds so small;
One little, two little, three little, four little,
Five little birds on the wall.
Kitty Cat came from a nearby bush…MEOW!
Gave the garden gate a push…SQUEEEEAK!
And one little, two little, three little, four little,
Five little birds went WHOOSH!

Model how to use your fingers to demonstrate the numbers, while saying the rhyme; encourage children to do the same. At the end of the rhyme, ask questions such as:

- *Who can show me three fingers?*
- *Show me all the fingers on your hand. How many fingers is this?*

Taking ideas further: Revisit rhymes regularly so that children can join in confidently. Produce a rhyme pack including, for example, five bird finger-puppets for the children to use in the book corner or at home.

Painting time



You will need: five painting overalls, five pegs next to the painting area

Discuss the painting area with the children and establish that it is not possible for everyone to use the area at the same time. Share some of the children's ideas about why that might be. Explain that you have set up some painting overalls on hooks on the wall. Show children the overalls on their pegs and explain that, as long as there is an overall left on a hook on the wall, they can take it and start to paint. Ask the children to think about how many overalls there are. Use questions such as:

- *How many overalls do you think there are?*
- *How can we check?*

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Encourage the children to count with you as you point along the line of overalls: *One, two, three, four, five.* Discuss with children how many people they think will be able to paint at any time.

When children choose to paint, take the opportunity to encourage them to count. Use prompts such as:

- *How many children were painting before you started?*
- *Now you have joined them, how many children are painting?*
- *Josh would like to come to paint. Is there room for him? How do you know?*

Taking ideas further: Build similar opportunities for counting into everyday routines.

Wash day

You will need: a puppet, a washing line and pegs, five T-shirts, two socks, four gloves, a clothes-basket

Explain that the puppet wants to know how many clothes he has. Show children the clothes-basket and invite them to help sort out the puppet's clothes.

Explain that he would like to know how many socks he has first. Take the socks and peg them up on the line, or ask a child to do so. Prompt the children to talk about how many socks they think there are. Use questions such as: *I wonder whether anyone can see how many socks there are.* Take suggestions. Ask children to show the same number of fingers as there are socks and confirm that there are two. *How did you know there were two? Did you need to count them?*

Take down the socks and ask children what they want to count next. Ask for volunteers to help hang up the clothes and count them. Encourage everyone to count together, pointing to each item of clothing in turn, each time.

Once all of the clothes are counted, prompt children to reflect on their counting. Use prompts such as: *Were the clothes easier to count when they were in the basket or on the washing line? Why? How do you make sure you count carefully?*

Taking ideas further: Encourage children to choose a number card to show the number of each item of clothing. Provide a washing line and pegs for children to use in their play.

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Eyes shut

You will need: small objects such as plastic bricks, small-world objects or counters

Invite children to do some counting with you. Explain that you are going to see if it is possible to work out how many objects there are in your hand, with your eyes shut. Model how to do this. Shut your eyes, hold one hand out and ask a child to put a few objects carefully into your hand. Demonstrate how to count the objects by feeling for an object with the fingers on your other hand, picking it up and placing it on the ground, while saying the appropriate number name. Explain what you are doing by 'thinking aloud', for example: *I am going to move one object at a time. One. Next is this block – two. There is only this object left – that is three. There were three objects in my hand.* Open your eyes. Encourage children to help you to check that you were right by counting the objects.

Encourage children to have a go. Prompt children to say aloud what they can feel. Use comments such as: *Tell us what you can feel. How many objects have you counted so far?*

Taking ideas further: Over time, try different numbers and types of objects; to increase confidence, items could be placed onto hands one at a time.

Puppet counting

You will need: a puppet, sets of party objects such as party bags, party hats

Explain to the children that the puppet is trying to get ready for a party but that he needs some help. Explain that there are going to be five people altogether at the party so he needs to get the right number of hats, plates, etc. ready.

Ask children to watch what the puppet does, to see if it needs help. Make the puppet put out three party plates then count one to five, putting out a plate on one, three and five. Model the use of number language through the puppet, for example: *I counted to five, so I have five plates. Is this right?...Oh, you think I have made a mistake. What did I do wrong?* Encourage children to try to explain the counting mistake that the puppet made and to demonstrate how to count the set correctly. Each time, use the puppet to re-emphasise children's suggestions, for example: *Oh, thank you, so every time I say a number name I need to touch an object.* Model the puppet putting out five plates correctly.

Make further mistakes. For example, put out four objects. Count one to five, touching one of the objects twice. Put out six objects and count one to five, not touching one object.

Once children have counted every object, ask: *How can we check that we have enough of each object for the five people at the party?* Try out their suggestions.

Taking ideas further: Once each set has been correctly counted (e.g. five plates), ask children how to reset the table for four; find opportunities for children to count objects to make sure there is one for everyone, such as counting out cups at drink time.

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One, two or three?

You will need: three hoops, number cards 1, 2 and 3, some photographs of objects normally found individually or in pairs, images of groups of three objects, a camera

Place a couple of cards or objects into each hoop so that one hoop contains individual objects (such as a photograph of a nose, a bin), a second contains objects normally found in twos (such as a photo of two eyes, a pair of socks) and the third contains images of objects in groups of three (such as wheels on a tricycle, legs on a three-legged stool, triplets).

Invite children to help you to add to the display. Encourage them to look at the objects in each hoop so far and to suggest how you have sorted the objects. If no one suggests that you have sorted them by number, show children the number cards 1, 2 and 3 and say that these cards could be used to label the hoops. *Which number goes with which hoop? Why?*

Encourage children to go for a walk (in pairs or a small group), inside and outside, to find other items that could be added to the display. Explain that if children cannot bring the actual objects, they can make a drawing or use the camera to take a photograph. Walk around with children, observing if they can instantly identify whether sets contain one, two or three items.

Taking ideas further: Play 'Odd one out', asking children to close their eyes while you move an object from one of the hoops to another. Can the children identify which object you have moved?

Find five

You will need: hoops or plates, five each of three interesting objects (to hide)

Show children objects that you have chosen to hide and explain that there are five of each of these hidden around the building, inside and outside. Invite children to go on a hunt to find the hidden objects. Suggest that as soon as they find an object, they bring it back and place it on the table or floor.

Encourage children to hunt in pairs so that they can discuss their ideas. Observe and listen to children as they hunt. Discuss the hunt with children, for example: *I can see that you have found two key-rings. Have you found anything else?* After a while, call children together by the pile of objects to look at what has been found so far. Lead a discussion about what has been found. Use prompts such as:

- *Could we organise the objects to see clearly what we have found so far?* (Use hoops or plates to sort the objects.)
- *How many stars have we found?*
- *Can you show me this number on your fingers?*
- *Have we found all of them yet?*
- *Which object have we found least of (or most of) so far? How do you know?*

Encourage children to hunt for the remaining objects until they are all found.

Taking ideas further: Change the number of each object hidden. Ask children if they can work out how many of each object they still need to find.

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Bug pelmanism

You will need: paper leaves with one, two or three 'bugs' drawn on them (four leaves for each number, with the 'bugs' arranged differently), counters

Invite children to play a game that involves matching leaves with the same number of bugs. Show children one of the leaves and ask them to describe what they see. Listen to their use of number language. If children do not automatically describe the number of bugs, model this yourself, for example: *The leaf has bugs on it. I think there are three of them. Who agrees?* Ask children to think about how they would use counting to check the number of bugs. Encourage children to demonstrate their methods. If necessary, model counting methods such as pointing to each bug, in order, or placing a counter on top of the picture of each bug and counting as you do so. Show children a few more of the leaves and treat them in a similar way.

Explain how to play the game. Turn the leaves face down. Encourage children to take turns to turn over two leaves and to say the number of bugs on each leaf. If the leaves show the same number of bugs, the child keeps them. If not, they turn them back over. As children play, prompt them to talk about the numbers involved:

- *You think this leaf has three bugs. Are you sure or do you want to check?*
- *Which of the two leaves you turned over has more bugs on it?*

Taking ideas further: Extend the number of bugs on the leaves. Encourage children to create their own sets of pictures to play with.

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Counting sets: Phase 3

Phase 3 focuses on extending children's counting skills to enable them to count up to ten objects, actions or sounds accurately. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

one, two, three, four, five, six, seven, eight, nine, ten, number, count, more, less, few, more than, less than, fewer, fewer than, amount, the same as, How many...? How many altogether?

Effective practice

- Look for everyday opportunities to model the language and actions involved in counting groups of objects.
- Make sure that children know the counting sequence one to ten before expecting them to count the equivalent number of objects, sounds or actions.
- Count sounds or actions by counting aloud in unison. When children are secure, encourage them to whisper the count quietly and then to 'hold' the count on fingers or in their head.
- Model and regularly rehearse using fingers to represent each number in a count.
- Model strategies that help to ensure you count one number for each object and then provide opportunities for children to rehearse these strategies.
  - Move objects from one location to another; for example, place objects in a line in order to count them accurately.
  - 'Mark' objects that cannot be moved as they are counted, for example, by placing a counter on top of each of them.
- Encourage children to compare numbers in different sets by counting the objects in each set and then identifying which number is bigger or smaller, or whether the numbers are the same.
- Provide opportunities for children to use everyday equipment to partition a small group of objects and recombine them; for example, share out a set of puppets to use in their play and then count them all back together again.

Look, listen and note:

- instances in which children count a set of objects, sounds or actions and the strategies they use to support accurate counting;
- the range of contexts in which children count accurately, including counting actions, sounds, objects that cannot be moved, a small set from a larger one;
- how children compare the quantity of objects in two sets and the language they use;
- children partitioning up to four objects, describing how many are in each subdivision and the total number of objects.

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Areas of focus for each of the example activities

	Shopping lists	Finger fun	Box, fingers, action	Go fish
Page	60	60	61	61
Represent numbers up to ten, using fingers		✓	✓	✓
Count reliably up to 10 objects, including those that cannot be moved	✓		✓	✓
Count actions or sounds			✓	
Count out a smaller number of objects (up to six) from a larger group	✓			
Match and compare the number of objects in two sets, recognising when the sets contain the same number of objects				✓
Move around, or partition and recombine, small groups of up to four objects, and recognise that the total is still the same				

	Coin drop	Bug number track	Make dominoes	Farmyard friends
Page	62	62	63	64
Represent numbers up to ten, using fingers				
Count reliably up to ten objects, including those that cannot be moved		✓		
Count actions or sounds	✓			
Count out a smaller number of objects (up to six) from a larger group		✓	✓	✓
Match and compare the number of objects in two sets, recognising when the sets contain the same number of objects		✓	✓	
Move around, or partition and recombine, small groups of up to four objects, and recognise that the total is still the same			✓	✓

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Shopping lists

You will need: a shop set up in the role-play area, including shopping baskets, sets of items to buy, paper for shopping lists, a shopping list with items from the shop

Observe children engaged in role-play in the shop. Note the roles they are taking and the language they are using and whether they use counting spontaneously.

Devise a character for yourself and sensitively join in the role-play. Explain that you have a shopping list, but that you need help to get everything together. Talk with children to encourage them to count and check the number of items that go in your shopping basket. Use prompts such as: *The next thing on my list is six carrots* (picking up four). *Is this enough? Oh, thank you – one, two, three, four, five, six* (touching each carrot) – *that's better!* Provide opportunities for children to make decisions, for example: *I need something for a snack. What would you suggest?*

Where appropriate, model strategies for accurately counting a set of objects, for example, counting items one at a time into the basket. Adapt your interactions as appropriate for individual children, for example:

- *My list says three bananas, but I think I need more than that. How many could I have?*
- *I would like an apple for lunch every day this week. Can you help me work out how many I need?*

Taking ideas further: Encourage children to make their own shopping lists as part of their shopping role-play, using mark making or pictures.

Finger fun

Invite the children to do some finger-counting with you. Start by counting from one to ten together, raising a finger each time. Repeat this, encouraging children to join in the finger actions as well as the count. If appropriate, count backwards as well.

Encourage children to try to finger-count with their hands behind their backs. Count together to four: *One, two, three, four.* Then ask the children to bring their hands from behind their backs to show their four fingers. Do the same for other numbers.

Explain that, next, you are going to say a number and challenge children to show you that number of fingers as quickly as they can. Model how to do this, thinking aloud: *The number is seven. I am going to count one finger at a time – one, two, three, four, five, six, seven.* Encourage children to compare outcomes. Use prompts such as: *Look, Laurence has shown four fingers on one hand but Emily has shown two fingers on each hand – that's still four altogether.* Encourage children to check that they have shown the right number of fingers by counting as they touch each finger in turn to their nose. Model how to do this. If children struggle

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to show a particular number, take a short break and then repeat the example, to help children recall what they have learned. Watch for children who are starting to show the appropriate number of fingers without counting: *Ben, you were very quick – you knew how to show six fingers without counting.*

Taking ideas further: Regularly provide opportunities for children to use their fingers to support counting, for example, to accompany number rhymes.

Box, fingers, action

You will need: sets of appealing objects, several boxes**,** a number track

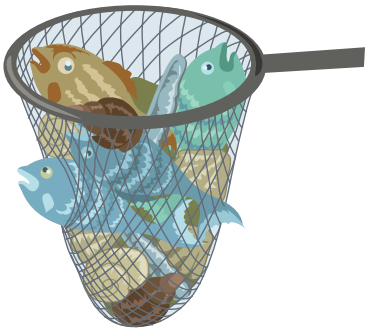
Place some objects into each box so that two boxes contain the same number of items but all other boxes contain different numbers of items (up to ten).

Ask children to sit in a circle. Invite them, in turn, to choose a box, shake it and describe what they feel. Take a turn yourself to model the use of number, for example: *I can feel lots of things rattling around, so I think there might be quite a lot of objects in this box.* Each child should open their box and show everyone what is inside, counting the objects. If appropriate, you may wish to model strategies to support accurate counting.

Once the child has counted the objects, ask everyone to show the same number on their fingers. Ask a child to suggest an action (clapping, jumping, winking...) for everyone to do the same number of times. Carry out the appropriate number of actions, counting aloud alongside each action. *Does anyone have the same number of objects as Nadia?*

Taking ideas further: Encourage children to compare the number of objects in each box. Use prompts such as: *How could we find out whether there are more objects in Amy's or Ben's box?* Make the equipment available for their play.

Go fish



You will need: a sand tray, interesting objects, fishing nets, ten buckets or bowls

Count out one of one object, two of another object, three of another object, up to ten of the last object. Bury these objects in the sand tray.

Explain to the children that there are some objects hidden in the sand tray. Invite them to use the nets to see what they can find. Observe children as they hunt. Listen to the number language that they use spontaneously. Encourage children to count and describe what they find. Use comments and prompts such as: *Danny, you have found lots of things in your net. I wonder how many objects you have found. How could you check?*

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Encourage children to sort the objects they have found into the buckets or bowls. Observe how they do this. Prompt them to discuss what they have found. Ask questions such as:

- *Which object is there only one of, so far?*
- *Can you see any buckets that have six objects in them?*
- *Which object have you found most of, so far? How do you know?*
- *Have you found more stars or more jewels? Show me with your fingers how many jewels you have found.*

Taking ideas further: Provide number cards 1 to 10 and ask children to match the number of objects in each bucket or bowl to the appropriate number card. Children could place the buckets in order, least objects to most objects. Encourage children to make 'treasure hunts' for each other, choosing some of their favourite objects to hide.

Coin drop

You will need: 1 to 10 number tracks, counters, a tin, 1p coins

Say that you are going to start by practising counting aloud. Ask children to practise, with you, as you count to different numbers. Move a counter along the number track in time with a count from 1 to 10. Model your thinking aloud, for example: *Let's count up to eight. We're going to start on one, so I need to get the counter ready to place on the one as we start the count. Ready? One, two, three, four, five, six, seven, eight. What number did we count up to?*

Now ask the children to listen very carefully as you drop some coins into the tin. When you stop dropping coins into the tin, ask children for suggestions about how many coins there are in the tin now. Prompt children to suggest how you could check whether they are right. Try out their ideas.

Taking ideas further: Use a range of sounds or actions for children to count.

Bug number track

You will need: ten pieces of card, each showing a big leaf, bug counters and reusable sticky pads or small pictures of bugs and glue

Invite children to help you make a number track that shows different numbers of bugs. Encourage each child, or pair of children, to take a leaf card. Explain that you need to work together so that each card shows a different number of bugs from one to ten. Invite each child or pair to choose a number up to ten and to count out that number of bugs and stick them onto their leaf. As children work, encourage them to discuss what they are doing. Use questions such as:

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- *What number have you chosen, Luke? Can you show me that you have that number of bugs?*
- *Who can guess which number Emma chose?*
- *Are there more bugs on Jo's or May's leaf?*

As more cards are completed, encourage children to work together to ensure that there is one card for each number up to ten. Use prompts such as:

- *Let's see which numbers we have so far. Are any of the numbers the same?*
- *How could we organise the leaves to help us to work out which numbers are still missing?*

When all of the leaves are completed, ask children to work together to make a number track. Use prompts such as: *Which leaf will go first? Why? What are you going to do next?*

Taking ideas further: Provide digit cards or stamps so that children can label each cell with the appropriate numbers. Make number tracks generally available.

Make dominoes

You will need: sticky dots, rectangular cards in different colours, cut into domino-shaped cards with a central line

Invite children to make their own sets of dominoes with up to four dots in total. Encourage children to explain what dominoes look like. Give children different-coloured card.

Explain that you are going to start by making all of the different dominoes that you can that use only one dot altogether. Ask everyone to have a go at making a domino that has only one dot. Make a domino yourself so that you can model the use of mathematical language, for example: *I have one dot. I am going to place it on this side of my domino.* Compare children's examples. Show that it doesn't matter which side you stick the dot by turning the dominoes around.

Next make dominoes that have two dots. Encourage children to discuss what they are doing and to compare their dominoes. Use prompts such as:

- *You have taken two sticky dots. Where are you going to stick them now?*
- *Paul and Sam's dominoes look different. Why? Do they both have two dots altogether?*

Encourage children to make sure that they have all possible ways of using the dots each time. Where necessary, use questions such as: *Sam, you have made a two-dot domino with both dots on the same half of the domino. How could you put two dots onto this domino so that they are not on the same half?*

Continue until children have made all possibilities up to a total of four dots. Encourage them to look at the sets they have created. Ask questions such as:

- *Can you find all of the dominoes with three dots on one half?*
- *Who can describe the way that the dots are organised on this domino?*
- *How many dots altogether are there on this domino?*

Taking ideas further: Children could play games with their sets of dominoes.

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Farmyard friends

You will need: model farmyard animals, fencing to make two fields

Invite children to help you to sort out a problem. Explain that the farmer has four animals and two fields. He likes to give them a change every day by varying how they are put out in the fields. He wants to find lots of different ways to put the four animals into the two fields.

Encourage children to choose four of the same animal and give them names, such as sheep called Buttercup, Daisy, Poppy and Rose, and to find as many different ways as they can to put them into the two fields. Help them to describe what they are doing. Use prompts such as: *You have two sheep in one field. What are you going to do next? How many sheep have you put in each field this time? How many animals are there altogether?*

Taking ideas further: Use a range of different contexts such as shopping in baskets, fruit onto plates, cars into garages.

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Counting sets: Phase 4

Phase 4 focuses on extending children's counting skills to enable them to count up to ten objects accurately, in any arrangement. The early stages of addition and subtraction are developed as children begin to partition and combine sets and to remove objects from sets. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

zero, one, two, three, four, five, six, seven, eight, nine, ten, number, count, total, more, less, more than, less than, fewer, fewer than, amount, one more, one less, estimate, guess, before, after

How many...? How many altogether? How many are left?

Effective practice

- Provide children with a variety of counting opportunities, including counting objects they can move, objects they can touch but not move, objects they cannot touch, sounds and actions.
- Count sounds or actions by counting the sound or action aloud, in unison. When children are secure, encourage them to whisper the count quietly to themselves and then to 'hold' the count on fingers or in their head.
- Model and regularly rehearse using fingers to represent each number in a count, for example, using fingers to represent numbers in a rhyme.
- Model strategies that help to ensure children count one number for each object and then provide opportunities for them to rehearse these strategies.
  - 'Mark' objects that cannot be moved as they are counted, for example, by placing a counter on top of them.
  - Where objects cannot be touched, point to or nod at objects in turn, while counting aloud or on fingers.
- Help children to understand that they can find one more or less by counting on or back, rather than recounting the whole set.
- Explore with children how numbers can be partitioned in different ways, for example, six can be partitioned into five and one, four and two, three and three. Help children to notice the patterns in such sequences.

Look, listen and note:

- how well children adapt strategies to count sets of up to ten objects accurately, in different contexts, for example, counting objects that cannot be moved;
- children's recognition of common patterns of objects such as dots on dice;

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- how children work out the number in a set when one object is added or removed;
- children partitioning up to ten objects, describing how many there are in each subdivision and the total number of objects;
- how children find how many there are altogether after two sets have been combined;
- how children find how many are left after some objects are removed from a set;
- how well children demonstrate their understanding that number is conserved when the objects in a set are moved around;
- how children describe an empty set.

Areas of focus for each of the example activities

	Ten interesting things	Red or white	Dotty pictures and dice	Handfuls
Page	68	69	69	70
Count reliably any arrangement of up to ten objects	✓	✓	✓	✓
Instantly recognise, without counting, familiar patterns of up to six objects	✓		✓	
Begin to estimate how many objects can be seen and check by counting (up to ten)		✓	✓	✓
Find one more or one less than a number from 1 to 10	✓		✓	
Partition and recombine small groups of up to ten objects		✓		
Find the total number of objects in two groups by counting all of them	✓			
Introduce the empty set (0)	✓			
Recognise that the number of objects in a set does not change if they are moved around		✓		✓
Remove objects from a small group and count how many are left		✓		

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	Dressing up	Ladybirds	Busy bus	Our train
Page	71	72	72	73
Count reliably any arrangement of up to ten objects	✓	✓	✓	✓
Instantly recognise, without counting, familiar patterns of up to six objects				
Begin to estimate how many objects can be seen and check by counting (up to ten)				
Find one more or one less than a number from 1 to 10	✓		✓	✓
Partition and recombine small groups of up to ten objects		✓		✓
Find the total number of objects in two groups by counting all of them		✓	✓	
Introduce the empty set (0)			✓	
Recognise that the number of objects in a set does not change if they are moved around		✓		✓
Remove objects from a small group and count how many are left			✓	

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Ten interesting things

You will need: plates, a selection of interesting objects, large 1 to 6 dice with spots

Invite children to take a plate and sit in a circle. Ask: *How many objects do you have on your plate now?* Note how children describe the empty set. You may wish to model appropriate language, for example: *That's right, we have no objects on our plates to start with.* Place containers filled with lots of interesting objects in the middle of the circle. Explain that you are all going to take turns to choose some objects you like until everyone has ten objects on their plate.

Children should take turns to roll the dice and use counting or recognition to say the number it shows. Describe their responses, for example: *Riyan knows that this pattern with one dot in each corner makes four dots altogether.* Encourage the other children to show using their fingers the same number as they can see on the dice. The player should then choose that number of items from the plates of the other children and add them to their plate. Encourage them to talk about what they are choosing. Take a turn yourself to model appropriate language, for example: *I rolled 3. I like the marbles so I am going to take two of those and I am going to take one key-ring. That makes three things altogether one, two, three.*

As children play, prompt them to keep track of how many objects they have on their plate in total. Use descriptions and questions such as:

- *Eli has five things on his plate and has just rolled 1. How many will this make?*
- *How many objects has everyone got now? Who has most? Who has the fewest?*

Taking ideas further: Similar games can be played by changing the rules. Make the equipment available for children to use to create their own games.

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Red or white

You will need: counters or pieces of card with one face red and one white

Ask children to take ten counters and to help each other check they have exactly ten. Ask one child to drop their counters on the table; ask everyone to estimate how many counters with the red face showing they can see. *How many counters are there altogether? Ten. Megan estimates that six are red.* Ask a second child to count the counters with the red face showing, discussing the strategies they use. Estimate the number of counters with the white face showing before asking someone to count them. Discuss estimates, for example, *Emma, you thought that there were six white counters. How did you decide?*

Repeat the activity, using prompts to draw out discussion about strategies to estimate how many counters there are of each colour.

Taking ideas further: Change the number of counters. Keep the total number of counters secret so that children do not have a benchmark for their estimates. Provide other contexts to support children's estimation skills.

Dotty pictures and dice

You will need: art materials, sticky dots or circles of different sizes, a 1 to 6 dotty dice

Show children an example of a picture that incorporates sticky dots or circles, for example, six circles might be used to form the wheels of a truck. Ask the children to describe what they can see. If they do not mention the number of dots, use prompts such as: *I chose a number of dots to use. Can you work out how many?*

Encourage children to choose a number of dots (six or fewer), then count out their chosen number of dots and think about how to use them in their picture. As children work, discuss their picture. Use prompts such as:

- *I like the way you are turning your dots into bugs by drawing on legs.*
- *How many dots are already in your picture? Now, you're sticking down one more. How many does that make?*

When several pictures are completed, invite children to join you for a game. Take turns to roll the dice, model and then prompt children to count or describe the number: *This pattern has one dot on each corner. I know that makes four dots altogether.* Ask the player to identify a picture with the same number of dots or circles. Use language such as: *You think the picture of the train might have five dots. Who else agrees? How could you check? How did you make sure you counted each dot once?* As other children take turns, encourage them to discuss the activity: *Alfie's picture has five dots. Does anyone have a picture with one fewer?*

Taking ideas further: Display the pictures as part of a number or counting display and use this as a basis for counting and comparison of numbers.

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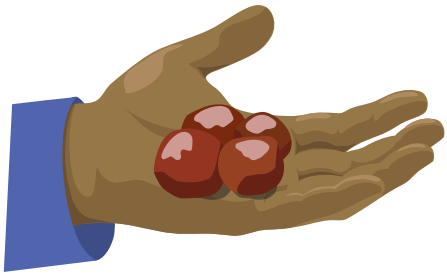
Handfuls



You will need: interesting objects such as conkers, coloured paper, reusable sticky pads

Make available sets of the same object but different sizes. Challenge children to find out who can take the biggest handful. As children take a handful of objects, encourage them to estimate and count the number of objects. Use prompts such as:

- *I managed to pick up six conkers. I wonder if you have more or fewer than six in your hand. What do you think?*
- *You picked up four conkers in your handful; how many marbles do you think you can get in a handful?*

Observe the strategies they use to count objects accurately. Model strategies where helpful.

Encourage children to record each handful by sticking the objects onto paper, using reusable sticky pads. Children might record their name and the number, using mark making or number stamps or cards, or you might scribe for them.

Taking ideas further: Make a display of the 'handfuls' and use it as a basis for further estimation; for example, mix up the labels and ask children questions such as: *Do you think there really are only two conkers on that plate? What might have happened to the label?*

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Dressing up

You will need: dolls or teddy bears, dressing-up clothes for them, including items such as gloves, shoes, hats; a dice or spinner labelled *1 more* and *1 fewer*, a 1 to 10 number track

Invite children to play a dressing-up game. Explain that the game will start with the doll or teddy wearing five pieces of clothing but then wearing *1 more* or *1 fewer* pieces, according to the throw of the dice or spinner. Encourage children to describe and count their five items. Use language such as: *You have chosen the waistcoat first, Dylan. What are you going to choose next? Which things have you chosen? How can you show that you have five pieces of clothing?* Once all the dolls or teddies are ready, encourage children to take turns to roll the dice or spin the spinner and to choose one more piece of clothing to put on, or select a piece to remove, depending on the outcome.

On each roll of the dice, ask children to say how many clothes the doll or teddy is wearing and to predict how many they will be wearing with one more or one fewer. Encourage children to explain how they know, or model this yourself, for example: *Ryan's teddy was wearing seven items*. (Show seven fingers.) *Now he has one fewer, so we have to count back one from seven.* (Take down one finger.) *That is six*. You may wish to use the number track to reinforce this.

Taking ideas further: Change the dice, for example, so that some of the faces are labelled *2 more* and some *2 fewer.*

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Ladybirds

You will need: red oval cards with a dividing line along the longer axis, black sticky dots, a display board

Explain to the children that you are going to work together to make a display that shows as many different ladybirds as possible that each have a total of ten spots altogether.

Invite children to try to make a ladybird with ten spots that is different from any that have been made so far. If their ladybird is different, they can add it to the display. Encourage them to describe what they are doing. Use prompts such as: *You are getting some spots ready. How many? How many spots are on each side of your ladybird? How many spots is that altogether?*

Use the display to discuss the different ways in which the ten spots were split, asking questions such as:

- *How could we check that all of our ladybirds are different?*
- *Which ladybirds have two spots on one side? How many spots are on the other side? How many spots does this make altogether? So ten can be split into two and eight. What other ways are there of splitting ten?*

Taking ideas further: Use ladybirds or other appropriate contexts to explore the partitioning of other numbers.

Busy bus

You will need: ten mats, chairs or big blocks set out as a bus plus one extra for the driver, cone for bus stop

Take on the role of bus driver. Invite children who would like to be passengers in your bus to sit in front of the bus in a line and to listen carefully so that they can join in as they are needed.

In role as the driver, start a commentary; for example:

I am just leaving the bus depot. There are three people at the first bus stop. (Motion for the first three children to stand at the 'bus stop'.) *Doors opening, in you come, fare please... Oh, four new passengers at the next stop. Doors opening, fare please. Hmm, there were three passengers and four more have got on; how many passengers are on the bus now? Two passengers want to get off at the next stop. Bye then. So there were seven passengers, but two have got off; how many are there on the bus now?*

Continue the role-play, but break the action each time people get on or off to ask children to count how many passengers there are still on the bus. Include instances where one passenger gets on or off to help children predict and then find one more or one fewer than the number on the bus. Include an example where all passengers get off the bus. Ask children to describe how many children are on the bus at this point and notice how they describe this empty set.

Taking ideas further: Encourage children to take on the role of driver, keeping up a commentary.

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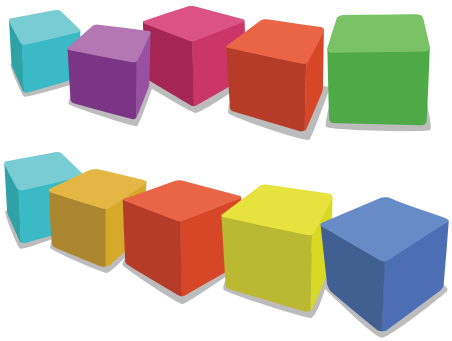
Our train



You will need: more than ten large building blocks of several different colours

Invite a small group to join you as train engineers. Explain that you need a train that has ten carriages. Ask them to get this ready, deciding where each carriage should go. Observe how children go about this. Encourage them to use mathematical language as they do so. Use prompts such as: *How many carriages have you put on so far? How can we check that we have ten carriages?* Once the ten carriages have been arranged, prompt children to rearrange them to put carriages of the same colour together. *How many carriages do we have now? How do you know?*

Continue the role-play, asking for a carriage to be added or taken away at each stop, for example: *There is no one in the last carriage, so we are going to take it off. How many carriages are there now?* Watch for children who do not need to recount the carriages but instead give the number before or after. Ask these children to explain their methods to the others.

Encourage children to make up their own story-line to continue the role-play.

Taking ideas further: Adapt the role-play to include adding on or removing a certain number of carriages at each stop.

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Counting sets: Phase 5

Phase 5 focuses on extending children's counting skills to enable them to estimate, count and compare sets of up to 20 objects. Addition and subtraction are further developed as children partition and combine sets and count on and back. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

zero, one, two... twenty, number, count, estimate, about, more, less, most, least, more than, less than, amount, count on, count back, put together, add together, total, take away

How many...? How many altogether? How many are left?

Effective practice

- Give children a variety of counting opportunities, including counting objects they can move, objects they can touch but not move, objects they cannot touch, sounds and actions.
- Model and rehearse how to use fingers to hold a count for objects that you cannot touch.
- Ensure that children are confident in saying the number sequence from 0 to 20.
- Practise counting forwards and backwards from different start numbers.
- Model how to determine which of two numbers is bigger or smaller, for example, using a number track or line, and how to use this to compare sets of objects.
- Discuss clues that help children to make sensible estimates, for example, make comparisons to a known amount.
- Make sure that children are secure in showing the numbers 1 to 10 on their fingers as they will need this to help them add or subtract by counting on or back.
- Teach children how to add by holding the number in one set in their head then counting on, using fingers to keep track of how many have been added.
- Initially, model subtraction as taking away by placing objects along a number track, removing a given number and counting back as you do so.

Look, listen and note:

- how well children adapt strategies to count sets of up to 20 objects accurately, in different contexts, for example, counting objects that cannot be moved;
- which numbers of objects children can recognise quickly and whether the arrangement is a common pattern, such as the dots on dice, or random;
- whether children are able to suggest an estimate for a quantity and whether their estimate is based on reasoning;
- situations in which children count on to add two quantities rather than counting all objects;
- situations in which children count back to work out what is left after taking away;
- how children work out how many objects have been removed from a set.

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Areas of focus for each of the example activities

	Seedlings	Containers	Going dotty	What can I buy?
Page	77	78	78	79
Count reliably more than ten objects	✓	✓		✓
Find the total by combining two groups where one group is screened (seen and then hidden) and counting on				
Compare sets of up to 20 objects, using language such as 'more' or 'fewer'	✓	✓		✓
Estimate a number of objects that can be checked by counting	✓	✓		✓
Instantly recognise, without counting, organised and random arrangements of small numbers of objects			✓	✓
Remove a smaller number from a larger and find how many are left by counting back from the larger number		✓		
Begin to find out how many have been removed from a larger group of objects by counting up from a number				

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	Biscuit tin	Track back	What's in the machine?	Toys in bed
Page	80	80	81	81
Count reliably more than ten objects				
Find the total by combining two groups where one group is screened (seen and then hidden) and counting on	✓			
Compare sets of up to 20 objects, using language such as 'more' or 'fewer'				
Estimate a number of objects that can be checked by counting				
Instantly recognise, without counting, organised and random arrangements of small numbers of objects				
Remove a smaller number from a larger and find how many are left by counting back from the larger number		✓		
Begin to find out how many have been removed from a larger group of objects by counting up from a number			✓	✓

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Seedlings

You will need: plant pots, soil, beans or large seeds to plant, stickers for the numbers 1 to 20

Invite children to choose a pot and plant some seeds. Ask each child to choose a number sticker to stick on their pot, read you their number and plant that number of seeds in their pot. Observe how children go about this. If they do not automatically count out their chosen number, use prompts such as: *You chose the number 12 but I am not sure that you have taken 12 seeds. How could you check?*

Encourage children to compare the pots and to predict how many plants may grow. Use prompts such as:

- *Whose pot has the most seeds in it? Whose has the fewest? How do you know?*
- *Jack, you planted 14 seeds. Not all seeds grow into plants. How many plants do you think will grow in your pot?*

As the plants start to grow, encourage children to look at their pots and discuss what they can see: *What can you see happening in your pot? Give me an estimate (sensible guess) for how many plants are growing in your pot.* Ask children to find a way to count the seedlings carefully. Observe how they do this.

Taking ideas further: Ask children to work out how many seeds did not grow; order pots according to the numbers of seeds or plants in each pot; talk about the tallest and shortest seedling in each pot.

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Containers

You will need: assorted containers, large marbles or objects of regular size, card

Invite a small group to join you to find out how many marbles can fit into different containers. Encourage children to discuss containers. Use prompts such as:

- *Can you describe the shape of this container?*
- *Which container do you think will hold most marbles?*
- *Which will hold fewest?*

Encourage children to take turns to choose a container and estimate how many marbles will fill it. Ask other children to estimate as well. Use prompts such as:

- *Uri thinks his cup will hold about 15 marbles. Who thinks it will hold more than this? Who thinks it will hold fewer? How many do you think? So, the smallest estimate we have is eight and the biggest is 30.*

Once the container is filled, write the number it held on a card.

Look at each container in turn. Encourage children to use their experience from previous containers to inform their estimates. Model reasoning, using language such as:

- *This jar is about as high as Uri's cup, but it is wider so I think it will hold more. Uri's cup held 12 marbles, so I think this jar will hold about 20 marbles.*

Ask a child to remove three marbles from one of the labelled jars and count back to say how many there will now be in the jar. Ask one of the children to count the remaining marbles to check.

Taking ideas further: Use a similar activity with only one container but different sizes of objects. Encourage children to make and justify estimates, using a range of equipment as part of sand and water play.

Going dotty

You will need: 3 × 3 squared paper (to use to make dot patterns for numbers), sticky dots to fit into the squares, a dotty dice

Invite children to help you make cards to play a game. Ask children to show you the face of the dice that has six dots on it. Encourage children to consider the pattern of the dots. Use prompts such as: *How did you recognise so quickly that this face has six dots? What is special about the pattern?* Respond to comments, reinforcing mathematical vocabulary, for example: *Jamie said that the dots are in two lines. How many dots are in each line? The six dots are in two rows* (pointing)*, with three dots in each: one, two, three... one, two, three.* Ask each child to take a piece of squared paper and some sticky dots and make the same pattern of six dots. Encourage them to talk about what they are doing. Use prompts such as: *How many dots have you stuck down so far? What are you going to do next?*

Show children a different arrangement of six dots and ask them how many dots they can see. Establish that there will be lots of ways to organise six dots onto squared paper. Ask each child to try to find a different arrangement.

Work together in a similar way to produce different patterns of five, four and three dots and use them in a game. Place the patterns in the middle of the table, face down. Then children take turns to select two patterns. If they show the same number of dots then they keep the pair.

Taking ideas further: Use the cards for similar matching games such as snap.

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What can I buy?

You will need: six shopping items, a price card for each item (prices up to 20p), quantities of 1p pieces to match the prices (each placed on a different-coloured paper 'purse')

Invite children to join you in a shopping activity. Ask children questions about the items for sale, for example: *Which item is the cheapest? Which is the most expensive? Does the pen cost more or less than the ruler? Which item would you most like to buy?* Ask the children to work together to organise the objects into order by price.

Show children the purses and explain that each of them has on it the amount of 1p pieces needed to buy one item. Ask them to take turns to choose an item they would like to buy and select the purse that they think has the matching amount of coins. Encourage them to count the coins: *You think that the red purse contains 14p. How could you check?* If the child has chosen the correct purse, they take the item and put the purse of coins next to the price tag. During the activity, model the use of experience to support accurate estimation, for example: *I think Malik has chosen well. He wants 15p and the purse he has chosen looks like it holds about the same as the 14p on the red purse.*

Once all of the items are 'bought', encourage children to put the coins from each purse in a 'tower' by the matching price. Ask: *What happens to the towers as the prices get bigger? Which price is lower, 18p or 14p?*

Taking ideas further: Encourage children to count coins in shopping role-play.

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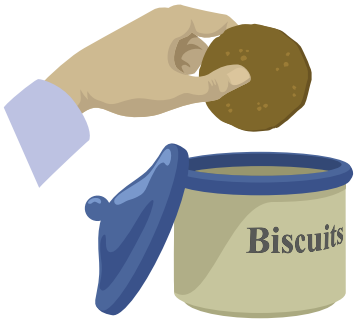
Biscuit tin



You will need: ten biscuits and a tin, a 1 to 10 number track

Show children the empty tin and ask them to count together to keep track of how many biscuits you put in it. After putting in five biscuits, stop and explain what you are going to do next: *There are five biscuits in the tin and I am going to add one more. Who thinks they know how many biscuits will be in the tin? Explain how you know.* Use the number track to reinforce explanations. Continue adding one more in this way, up to ten.

Next, count four biscuits into the tin. *How many biscuits are in the tin? To help us hold this number in our head, we are going to say the number and tap our head. Ready? Four* (tapping head). Place three more biscuits beside the tin and explain that you are going to add these biscuits. Demonstrate how to add by counting on: *Four* (tapping head), *five, six, seven* (placing biscuits one by one into the tin). *So, we added three biscuits, how many are in the tin now?* Explain that you are going to do that again, but would like everyone to join in the counting this time. Take out the three biscuits and repeat the process. Ask: *How many biscuits were in the tin? How many more did we add in? How many do we think there are altogether?* Tip out the biscuits and count to check. Repeat for other examples.

Taking ideas further: Use fingers to track how many objects have been added.

Track back

You will need: a 1 to 20 number track, 20 interesting objects, a dice or spinner labelled 1, 2 and 3 (each used twice)

Place the objects on the table and ask children how many they think there might be. Count together: *One, two, three... 20. How many objects are there? Whose estimate was closest?*

Show children the dice and explain that you are going to take turns to roll it and take away that many objects. Explain that the person who takes away the last object wins the game. Take the first turn yourself to model how to play: *There are 20 objects. I have rolled 2 so I am going to take away the last two objects. How many do you think there will be left? Let's count back to find out. There are 20, so count back two is 19, 18. Now let's use our number track to check. There were 20 then I took away two, how many are left?* Encourage children to take turns. As play progresses, encourage children to predict how many objects they think will be left before counting. Encourage children to discuss their strategies. Use prompts such as: *We have 15 objects. Sanam, you say that when Sam takes away three you know there will be 12 left. Can you tell us how you worked this out?*

Taking ideas further: Use fingers to keep track of how many objects have been removed. Use different numbers on the dice.

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What's in the machine?

You will need: cubes or counters, a large cardboard box, number cards 1 to 10, a 1 to 10 number track

Turn the cardboard box into a function machine by removing the top, cutting a slot in each end and turning the box on its side, with the open end away from the children. Explain that this is a number machine: you are going to put some counters in one end, the 'machine' will remove some and post the rest out of the other end.

Invite a child to choose a number card and count out that number of counters and 'post' the counters through the 'in' slot. Initially, play the role of the machine yourself, explaining what you are doing: *I am going to keep some of the counters then post the rest out of the 'out' slot like this. Amy put nine counters in; I wonder how many are coming out of the machine.* Post six counters out and invite a child to collect and count the output counters, then to choose the correct number card and place this above the 'out' slot. Discuss what has happened with the children: *So nine counters went it, but only six came out. I wonder how many counters are left in the machine. How could we use the number track to help us?* Try out children's ideas. Check by turning the machine round to reveal the three counters. Invite children to come to take turns being the machine.

Taking ideas further: Use addition; make the machine available for children's play.

Toys in bed

You will need: a blanket, ten toys, number cards 1 to 10

Ask children to choose ten toys and lay them in a row. Explain that the toys are in bed. Count together and establish that there are ten. Take the blanket and cover some of the toys. Ask children to describe what they can see. Encourage them to think about how many toys are under the blanket. Use prompts such as: *We know that there are ten toys. How many can we see? We can see seven.* (Place the digit card 7 on the visible toys.) *The others are hidden under the blanket. How can we work out how many toys are hidden without removing the blanket?* Try out any strategies the children suggest. If necessary, model how to count up to find the missing number. *Well, there are ten toys. We can see seven, so how many toys are covered?* Check, by pulling back the blanket to reveal the three toys.

Invite a child to cover up some of the toys this time and repeat the activity, encouraging children to join in the counting.

Taking ideas further: Link this activity to the rhyme: *There were ten in the bed*, asking how many had fallen out each time.

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Counting sets: Phase 6

Phase 6 focuses on using children's counting skills to support addition and subtraction through counting on and back and through counting from the smaller to the larger number to find a difference. Children also use their ability to count in twos, fives and tens to count large groups of objects efficiently. These example activities are intended to form part of a rich provision, promoting active learning through practical, hands-on exploration and play. In all of these activities, it is important that adults:

- listen to and observe how each child engages with the activity;
- respond to the child's actions and ideas;
- model the use of mathematical language, describing actions and 'thinking out loud'.

Key vocabulary

number names to 100, count, more than, less than, count on, count back, order, add together, add, total, take away, subtract, difference

How many altogether? How many are left? What is the difference between?

Effective practice

- Ensure that children can confidently count forwards and backwards up to 100 and can count in twos, fives and tens.
- Regularly rehearse with the children the skills that will help them to use and understand addition and subtraction strategies more readily. These include:
  - counting forwards and backwards from any start number to 100;
  - showing and recognising fingers that represent numbers 1 to 10;
  - raising a finger for every number to keep track of a count.
- Use small numbers initially when adding and taking away so that the major focus is on the calculation strategy rather than counting large numbers.
- Give children experience of finding the total number of objects in two sets by counting the objects in different orders, to understand that the total remains the same.
- Give children practical experience of adding through counting on, including where one set of objects is screened and using a number track or line.
- Model and rehearse how to add and subtract by holding the start number in your head then counting on or back, using fingers to keep track of the number added or removed.
- Help children understand the term 'difference' through visual images such as beads on strings, towers and number lines.

Look, listen and note:

- how well children adapt strategies to count sets of more than 20 objects accurately;
- situations in which children count on to add two quantities rather than counting all objects;
- how well children demonstrate their understanding that addition can be done in any order, for example, choosing to start from the bigger number when counting on;
- situations in which children count back to work out what is left after taking away;
- how children respond to the term 'difference', used in a number context, and strategies they use to find the difference between two numbers of objects.

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Areas of focus for each of the example activities

	Counting ITP	Combining boxes	Trains	Spinners
Page	84	84	85	85
Relate addition to counting on and recognise that addition can be done in any order	✓	✓	✓	✓
Count large groups of objects by using efficient strategies	✓		✓	
Understand subtraction as 'take away' and find a 'difference' by counting up				✓

	Goal	Snack time	Snakes	Balancing
Page	86	86	87	87
Relate addition to counting on and recognise that addition can be done in any order	✓			
Count large groups of objects by using efficient strategies		✓		
Understand subtraction as 'take away' and find a 'difference' by counting up	✓	✓	✓	✓

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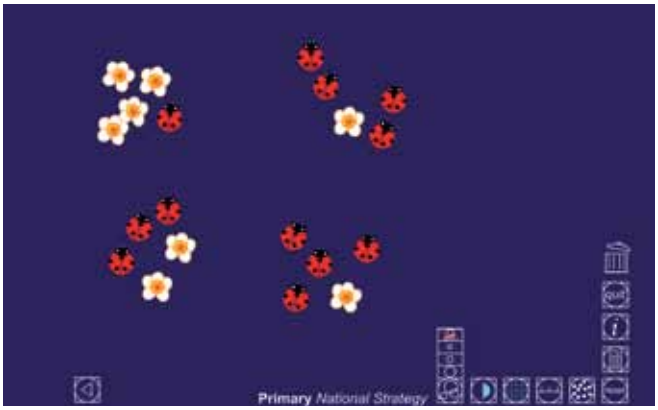
Counting ITP

You will need: Counting ITP, interactive whiteboard

Set up the screen without the children seeing it.



Click the calculator button, select the ladybird icon then key 12 into the calculator and click the single arrow key to show 12 ladybirds randomly on the screen. Repeat for eight flowers.

Invite children to talk about what they can see on the screen. Use prompts such as: *Describe what is on the screen. Roughly how many objects do you think there are altogether? How could we find out the exact number of objects?* Encourage children to try out alternative methods and discuss them. Use prompts such as: *Jason counted the flowers first, then the ladybirds, and found 20 altogether. Emily counted the ladybirds first then the flowers and got the total 20. What do you notice?* Establish that the order in which you add the items does not matter.

If children do not suggest organising the objects into groups or rows, then use a prompt such as: *There are lots of objects to count in ones. Can we count in bigger groups?* Respond to children's suggestions, for example, dragging the objects to form groups of five, then counting up in fives.

Taking ideas further: Repeat, using different numbers of objects. Use the 'rows of ten' button to discuss place value in two-digit numbers.

Combining boxes

You will need: boxes containing different numbers of items (each labelled with the number of items inside), number cards to 20 or blank labels

Pick two boxes and show them to the children. Ask what they think the number on each box tells them. Check by asking children to count the objects in each box.

Explain: *We are going to put the objects from these two boxes together. We need to work out how many objects that will give us altogether. How could we do that?* Encourage children to suggest different methods and try them. Include counting on methods, for example: *There are eight objects in this box and three in the other. Let's add the three objects into this box.* Ask children to count aloud as each object is dropped in, giving the total number of objects in the box so far*: We started with eight, that's nine, ten, eleven. How many objects are there altogether?* Write the total on a sticker.

Ask children to work in pairs, to choose two boxes and combine the objects into one box, working out the total to record on the box. Observe how children go about this.

Taking ideas further: Carry out similar subtraction activities, taking some items from one box to put into another and working out how many objects are left in the first box.

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Trains

You will need: interlocking building blocks of the same size, or interlocking cubes

Ask children each to choose a number between 10 and 20. They count out that number of blocks and build a train, then tell a partner the number of blocks in their train.

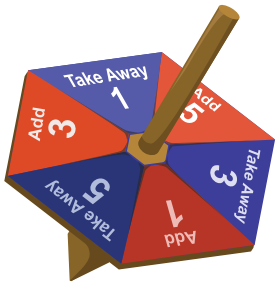
Explain that there is a competition to build the longest train. Say that you want each pair to move the blocks from one of their trains, one at a time, onto the other train. Encourage them to keep a count together of how many blocks in their combined train so far. Observe and listen to children as they do this. Prompt them to discuss their method. Use comments such as:

- *How many bricks were in each train?*
- *Which train did you decide to leave? Why?*
- *How many bricks do you think are in your train? How did you work this out?*

Explain to children that you would like them to check their total as quickly as they can. Ask for suggestions about how they could do this. Listen for suggestions of counting the blocks in groups such as twos; propose and model this as a method if children do not suggest it. When children have checked their totals, ask everyone to say how many blocks there are in their train. Encourage children to compare the sizes of their trains. Use prompts such as: *Which is longer, Eli and Rachel's train or Kalada and Ellie's? How do you know? Does anyone have a train that is between the two?*

Taking ideas further: Ask pairs to record a number sentence for their trains.

Spinners



You will need: a hexagonal spinner labelled *add 1, add 3, add 5, take away 1, take away 3, take away 5;* 1p coins, paper plates or purses, 0 to 20 number line

Invite children to play a game. Ask everyone to take ten 1p coins to start with. Children should then take turns to spin the spinner and carry out the appropriate operation. Encourage children to use counting on or back to find out how many pennies they have on their plate. Use prompts such as: *How many pennies are on your plate now? You have to take away five. Are you going to count on or back? Try to count backwards to find out how many pennies are left on your plate.* Explain that you are going to have five spins each and whoever has the amount of money closest to 10p at the end wins the game.

As you play, encourage children to compare their totals. Use prompts such as:

- *Who has most money at the moment?*
- *Do you have more or less money than Josie now?*

Once everyone has had five spins, ask children to check their final totals and work out who is closest to 10p. You may want to use a number track to support this.

Taking ideas further: Change the numbers on the spinner and the criterion for winning.

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Goal

You will need: a 0 to 20 number line chalked onto the ground outside, with cones to mark 'goals' at 0 and 20, a circular marker for the 'ball', a large dice marked +2, +4, +5, –2, –4, –5

Invite two children to play football. Each child should choose which goal they are going to have (they will score when the ball gets to this goal). Explain that at the start of the game the ball should be in the middle of the pitch. Since the goals are on 0 and 20, ask children to explain which number they think the ball should go on.

To play the game, children take turns to roll the dice and carry out the appropriate operation. Encourage children to discuss each 'kick'. Use prompts such as: *What number is the ball on? Do you need to add or take away? So which direction will the ball go in? Count to check where the ball will land.* If children are confident, encourage them to turn away from the number line or shut their eyes and to work out, by counting forwards or backwards, where they think the ball will land after each kick before checking on the number line.

Taking ideas further: Alter the operations on the dice. Leave the markings for children to use in their play.

Snack time

You will need: fruit or vegetable pieces, a plate, children sitting in groups, a 0 to 30 number line

At snack time, remind children how many are present today and ask for a volunteer to count out the right number of snacks onto a plate. Since it is big number, ask for suggestions about how to count the snacks more quickly. Follow up any suitable suggestion. If children do not suggest any strategies, use prompts such as: *We need to count out the snacks, but do we need to count in ones? What other numbers could we count up in?* Use a strategy of counting in groups such as twos, with all children counting on two each time the volunteer puts two snacks onto the plate.

Ask the volunteer to take the snacks round, a table at a time. Explain that everyone should count together how many snacks are left on the plate. Encourage children to think about the count. Use prompts such as: *Will we need to count forwards or backwards? How do you know?* Start the count with children: *28, 27, 26, 25...*

After each group has taken their snacks, stop the count and model the language of subtraction, for example: *There were 28 snacks on the plate. How many children have had a snack? How many snacks are left? So 28 take away six leaves 22.* As the numbers involved get smaller, ask children to make predictions: *How many children are there in the next group? Use counting to work out how many snacks will be left after this group has taken their snacks.* Check children's ideas by counting together. Use the number line to support the activity and to support commentary.

Taking ideas further: Use other everyday activities to discuss addition and subtraction, for example, working out how many children are absent at register time.

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Snakes

You will need: spherical beads of the same size, strings, number cards 10 to 20

Ask children to choose a number card and to count out that number of beads to make their snake. Tie a knot at both ends of each string so that the beads cannot move.

When you have snakes for each number, explain that you are going to compare pairs of snakes. Use prompts such as: *There are 13 beads in this snake and 18 in this one. Which snake has fewer beads in it? How many more beads are in the longer one?* Encourage children to find different ways of answering these questions. Include putting the two snakes alongside each other so that their tails match. Ask: *How does this help us to see how many more beads are in the long snake? These parts of the snake are the same size* (using hands to show). *This part is extra on the long snake. How many more beads are there in the longer snake?* Count the extra beads together, to check. Model the language of comparison and difference: *18 is five more than 13. Another way to say this is, 'The difference between 18 and 13 is five.'*

Look at other pairs of snakes in a similar way.

Taking ideas further: Ask children to work in pairs, comparing pairs of snakes and using the word 'difference'; leave the snakes for children to use in their own play.

Balancing

You will need: balance scales, clear plastic bags containing 5 to 15 uniform counters (each labelled with the number of counters inside), loose counters

Invite a child to choose two bags and read out the number of counters in each bag. Encourage everyone to discuss what will happen when the bags are placed on the balance scales: *Ryan says that the 14-bag will be higher than the 11-bag. Who agrees? How do you know?* Put the bags on to the scales to check. *Is that what we expected? What has happened? So why is the 14-bag lower than the 11-bag?*

Explain that you want to make the bags balance. Ask how this might be done. Take suggestions. Ask a child to add counters to the pan with the smaller number until the scales balance. Describe the situation, for example: *There were 11 counters in the bag. We added three. Now there are 14, so it balances the other bag. How many extra did we have to add to 11 to make the same as 14? This is called the difference, so the difference between 11 and 14 is three. The difference is the number you need to add to the smaller number to make the bigger number.* Invite children to do the same with other pairs of bags.

Taking ideas further: Use balance scales to secure number bonds in a similar way.

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Developing mathematics though a theme: Having a party

Mathematical activities should be developed within a relevant topic or theme that children initially instigated and is then supported and extended by an adult. This example illustrates how one such context, *Having a party,* might be used to develop children's understanding of number words, numerals and counting sets. Although all the activities follow the theme of a birthday party, they can be adapted to other contexts. The activities can also be simplified and extended to accommodate children within a range of phases.

Mathematical skills that could be developed within this theme include:

- recognising, describing and continuing patterns;
- counting, comparing and estimating the numbers of objects in sets;
- recognising, saying and identifying numbers and numerals;
- counting on and back to add or subtract objects.

Collecting resources

Involve the children, their families and friends and other members of staff in collecting resources for this theme. Make sure that the resources are available for children's independent use, as an enhancement to the home corner role-play or as a themed 'party' role-play area. Examples of resources you might include are:

- party tablecloth, napkins, paper plates, bowls and cups, plastic cutlery;
- party hats, badges, balloons;
- play dough or plastic party food;
- inflatable or artificial birthday cake and candles (possibly made from junk by the children);
- wrapping paper, gift bags, ribbon, birthday cards and present labels;
- a collection of teddies or toys to be party guests and to wear hats and badges;
- party bags and small gifts to wrap, for example, cereal-box toys, cracker toys, cheap party-bag multipack gifts;
- containers for sorting, counting and matching, such as small gift boxes or gift bags.

If you would like to explore numbers as labels with the children you might include:

- number badges and stickers;
- number cards, including some big numbers;
- blank laminated labels and a dry-wipe marker so that children can make their own number labels.

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Example activities

Birthday present number track

Use a selection of laminated sheets of wrapping paper to make a line of 'birthday presents' along the floor, to represent a number track that can be used for counting forwards and backwards. Each piece should be large enough for a child to stand on.

Let the children arrange the wrapping paper into a line. Put a 'start here' birthday card to show where to stand before you start counting along the line. Mark the last present with a bow.

Use the line of presents for counting activities, encouraging children to move forwards and backwards along the number track by throwing a dice to generate random numbers. You could:

- use a dice with 1 to 3 or 1 to 6 numerals or spots;
- use a dice with birthday symbols and define the meaning of each symbol, for example, a candle represents 1, a balloon represents 2;
- use children or soft toys as 'counters' in a game to see who will reach the end of the line of presents first;
- make a team game with two present number tracks, to see which team will reach the end of their track first;
- devise a game in which the winner is the person who stays on the track for the longest by choosing whether to move forwards or backwards along the line of presents as the dice is thrown.

As children grow in confidence, you could use a dry-wipe marker to write numbers on the laminated sheets, in numerals or in words, in each section of the number track. Children could explore how numbers are represented in numerals and words, and how they are read and ordered.

Birthday present barrier game

Use a selection of laminated sheets of wrapping paper, ensuring that there are two examples of each type of paper, to play a 'matching pairs' game. Ask a child to select a piece of wrapping paper and, without letting anyone else see it, describe the patterns they can see, for example: *The paper has different coloured balloons on it*. The child who can identify the matching piece of paper can keep the matching pair. This process is repeated until all items are paired.

As well as offering opportunities to apply counting skills, barrier games such as this encourage children to use mathematical vocabulary (rather than just respond to it), particularly positional language such as *behind*, *next to* and *above*.

Keep the laminated wrapping paper available for children to use independently, to invent their own games, either in the mathematics area or as an enhancement to outdoor play.

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How many presents?

Place different amounts of 'presents' (for example, wrapped cereal toys or cheap party bag toys) inside gift bags and give one bag to each child or pair of children. Ask the children to estimate how many presents there are in the bag and then empty the bag to count them.

You could then:

- provide number cards and ask children to select the correct number for their bag of presents;
- ask children to order their bags of presents onto a number track, asking questions such as: *Which bag comes after this one? Which bag comes before this one? How do you know? Where should Alisha put her bag? Why?*;
- put one more present in a bag and ask the children what would change.

Party game: Pass the plate

Use party plates for children to collect ten (or fewer) of their favourite items from your birthday collections.

Let children, in turn, choose an item from someone else's plate and add it to their own collection. The child who has gained an item should say how many they originally had on their plate and how many they have now. The child who has lost an item from their selection should also say how many they had originally and how many they have left. Continue round the group and then work out who has the most and who has the fewest objects left.

Passing the parcels

Put a selection of 'presents' into a large gift box. Ask children to estimate how many presents there are in the box before removing them and counting them. Now put all of the presents back in the box and pass the box around the group of children, allowing each child to take out a present as they take the box. Encourage the children to respond to questions such as:

- *How many presents have we taken out?*
- *How many presents are left?*
- *Who do you think will get the last present?*
- *Do you think there are enough presents for everyone to have one?*

You could also play this game to music, so that children only take a present when the music stops. Leave the party game resources as enhancements to your mathematics or party role-play area so that the children can continue to play independently.

Party problems

Use teddies as party guests and introduce party problems to the children. For example, explain that it is the end of the party and the final two teddies are waiting for their party bags. Provide empty party bags and a small collection of items such as gifts, balloons and cake. Ask the children to find different ways to share the objects between the two bags.

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Supporting material

Key messages

The following key messages underpin the approach taken throughout this resource and relate closely to the messages that are being reinforced throughout Key Stage 1 and Key Stage 2 within the *Securing level in mathematics* suite of materials.

- Every day is a mental mathematics day.
- Make mathematics interesting and personal.
- Hands-on, active learning is important.
- Talking mathematics clarifies and refines thinking.
- Seeing mathematics through models and images supports learning.
- Learning from mistakes should build up children's confidence.

Every day is a mental mathematics day

Ensure that children engage in some mental mathematics activity every day. For young children, most of their learning involves practical activity and discussion. For example, describing what they see or do and the reasons for the decisions they make helps them to clarify their thinking. Giving them practice in counting is particularly important as they need to learn the pattern and rhythm of numbers. *Don't expect confidence in counting if practice and repetition of early skills have not taken place.*

The activities in this publication are designed to help children encounter practical and varied experiences of counting, to become confident in their use of number and to develop the knowledge and skills that will allow them to solve problems.

Within this resource you will find many suggested contexts for early counting, for example:

- everyday routines – snack time, handing out equipment, registration, counting how many can play in different areas of provision such as in the sand, water and role-play areas;
- using senses –
  - sound, for example, clapping, dropping items into containers, use of instruments;
  - touch, for example, feely bags, taps on back;
  - sight, for example, bubbles, torch flashes, pieces of fruit in a bowl;
  - movement, for example, jumping, skipping, hopping;
- incorporating a counting focus in day-to-day activities – role-play, construction area, small-world area, sand tray, water tray, music area, table top, daily routines, large play, malleable, mark making.

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Make mathematics interesting and personal

Share your interest in mathematics with the children. Give children mathematics that engages them and is relevant to their lives and their culture. *Don't expect children to be interested in mathematics if you don't share an interest and all their mathematics is dull.*

Show children something you have found or share something you have done that involved numbers, such as:

- new shoes with the size on the box and the shoes;
- a ticket that has a seat number or a bus number;
- a birthday card with the age or a calendar.

Make sure the children see you engage in the activity and see you involved in shared talk and problem solving.

The principles of the EYFS should guide the work of all early years' practitioners.

- **A Unique Child**: every child is a competent learner from birth, who can be resilient, capable, confident and self-assured.
- **Positive Relationships**: children learn to be strong and independent from a base of loving and secure relationships with parents and/or a key person.
- **Enabling Environments**: the environment plays a key role in supporting and extending children's development and learning.
- **Learning and Development**: children develop and learn in different ways and at different rates and all areas of learning and development are equally important and inter-connected.

  Practice Guidance for the EYFS (May 2008), page 5

This publication promotes the use of play, models, images and problem-solving activities through the use of resources such as stories, songs, rhymes and games as a basis for planned learning opportunities, within both the indoor and outdoor environments. All of these elements provide opportunities for incorporating and building upon children's interests.

Hands-on, active learning is important

Provide children with appropriate practical equipment to use and manipulate, to help them to explore how and why things work and to learn to visualise, describe and represent what is in front of them. *Don't expect children to visualise mathematics without exploring it practically first.*

Play underpins all development and learning for young children. Most children play spontaneously, although some may need adult support, and it is through play that they develop intellectually, creatively, physically, socially and emotionally. Providing well-planned experiences, based on children's spontaneous play, both indoors and outdoors, is an important way in which practitioners support young children to learn with enjoyment and challenge.

Practitioners and teachers need to plan and resource a challenging mathematical environment, where children's play can be supported and extended. Practitioners can extend and develop children's mathematical language and communication in their play through sensitive observation and appropriate modelling and intervention.

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Children need practical hands-on opportunities to interact with a wide range of resources, including construction toys, real-life natural resources, for example, pebbles, fir cones, shells, buttons, socks, coins and mathematical equipment, for example, dominoes, 3-D shapes, number tracks.

In their exploration, children use the experiences they have and extend them to build up ideas, concepts and skills. They can try things out, solve problems and be creative, can take risks and use trial and error to find things out.

Talking mathematics clarifies and refines thinking

Give children the vocabulary and language of mathematics. *Don't expect children to explain what they are doing if they have no opportunity to use, develop and refine the language to do so.*

Combine talking about mathematics with engaging all the senses. *What number is your finger touching? Do these taste the same; how many tastes were there? What number have you covered with that shape? What is this number on the card – can you find the three-card? Listen to the sounds and tell me if there are always the same number of them – how many were there that time?*

From an early age children need to learn how to talk in mathematical terms about their experiences and how to explain their strategies and become confident speakers when responding to questions and challenges. To support this development, adults need to model the language of mathematics.

Children will be most stimulated to talk about mathematics when they are interested and engaged in the materials and context. They can be involved in purposeful activities such as setting out enough plates for a party or checking all of the bikes have been 'parked up' at the end of the day.

Seeing mathematics through models and images supports learning

Help children to see how mathematics works and can be represented through a physical object, picture or diagram, such as number tracks or number lines. *Don't expect children to visualise and 'see' how something works if they have no models and images to draw on.*

Children need 'immersion' in an image, and this process of immersion starts with play. Children will need to familiarise themselves with equipment, through play, before being asked to use it to support their mathematics. We might know that a particular piece of equipment is useful but if a child does not know how it could be used then it won't be useful to them.

Models and images should be readily available and easily accessible to children in all areas of provision, not just 'mathematics areas'.

Learning from mistakes should build up children's confidence

It is important to look out for mistakes and encourage children to recognise that making mistakes is something everyone does. *Don't just tell children something is wrong; help them to see what went right and to work out when it went wrong.*

Make mistakes, or use a puppet to make some common mistakes, and encourage children to work together to identify and correct them. For example, pretend that the puppet counts the same child twice when finding out how many children are in the group.

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Engage children in situations where neither the adult nor the child knows the outcome, for example, hunting together for objects hidden by somebody else in the sand tray. Model thinking aloud, for example: *Oh dear I thought I had put out enough cups for the tea party but I've run out. I must have forgotten to add two for the adults.*

Avoid asking closed questions to which it is obvious that the adult already knows the answer, such as: *What number is this?* Try to pose questions with more than one possible response, such as: *How could you make this necklace longer?*

Learning environment audit

Developing indoor and outdoor learning environments to support mathematics

Providing a wide and diverse range of high-quality learning experiences and indoor and outdoor environments that support mathematics is vital. It may be useful to audit the learning environment, using the following prompts. Where possible, ensure that all members of the team contribute to this audit. A full copy of this audit can be found in the *Early Years Quality Improvement Support Programme* booklet (DCSF ref: 00669-2008BKT-EN).

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	In place	Area for development	Comments
The indoor learning environment • Is the setting bright, well organised and inviting to walk into? • Are the resources and working areas clearly labelled, with words, pictures, numbers or real objects where appropriate? • Do the resources reflect all families and cultures? • Is there an accessible number track or number line displayed at child height, with picture clues where appropriate? • Do displays include numbers that have been typed and handwritten by both adults and children? • Do the displays celebrate children's achievements in mathematics and support children's future learning? • Are there interactive displays and investigation areas that promote children's exploration of mathematics? • Are mathematical resources readily accessible throughout the environment, as well as within the mathematics area? • Are numbers written in other languages and scripts?			

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	In place	Area for development	Comments
The outdoor learning environment • Does the outdoor environment complement and extend the indoor environment? • Is the area well organised, inviting and challenging? • Are there opportunities for children to be physical? • Are there opportunities for children to be messy on a large scale? • Can children access resources and return them independently? • Are there opportunities for children to explore mathematics through movement, e.g. obstacle courses, den-making, travelling games, construction on a large scale? • Is there a washing line at child height so that children can peg numerals in the correct order or objects to make repeating patterns, e.g. socks and shirts? • Are there opportunities to draw shapes, patterns or numerals on a large scale, e.g. chalking on floors, large-scale chalk boards, easels, 'painting' with water and decorators' brushes? • Are there permanent playground markings or chalked markings that support mathematics, e.g. shapes, numerals, tracks? • Is there a number line and height chart? • Are there small resources and 'targets' to support scoring and the use of tallies, e.g. basket-ball hoops, beanbags, quoits, skittles, knock-down cans?			

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	In place	Area for development	Comments
The mathematics area • Are there story and information texts that support understanding of the use of numbers for labels and for counting, early calculation and shape, space and measures? • Is there a height chart showing standard and non-standard measures? • Is there an appropriate number line at child height? • Are resources clearly labelled so that children can access them independently? • Is there a wide range of natural resources, e.g. pebbles, fir cones, shells? • Is there a wide range of commercially produced resources to support exploration of number and calculating, shape, space and measures? • Can children access games independently, e.g. lotto, snap, dominoes, track games? • Are there 'collections' of objects for children to investigate, sort and sequence, e.g. boxes, buttons, socks, coins, beads, keys? • Is there a display that draws attention to numerals in the environment and in everyday life? • Can children display their early attempts at recording independently? • Is there a washing line at child height so that children can peg numerals in the correct order?			

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	In place	Area for development	Comments
Other areas of provision and learning zones • Are resources that support mathematics high profile in all areas of provision and learning zones? • Are children encouraged to use resources from the mathematics area to support their learning in other areas of provision? • Are there opportunities for children to match 3-D objects to 2-D silhouettes, e.g. sand play? • Are there books and cards with words of number songs and rhymes in the music and sound-making area? Are there number props, e.g. five frogs, ten in a bed? • Are there empty boxes and packaging, reclaimed materials and materials to encourage exploration of pattern in the creative workshop? • Are books that support mathematics high profile in the book area? Are there story props to accompany the books? • Are numerals explicit in small-world, imaginative play, e.g. road signs? • Are there practical, hands-on opportunities to explore shape, space and measures, e.g. sand, water, play dough, clay? • Does the large block area or small construction area have visual images of things children can construct, photos of children's constructions and a range of construction equipment, including reclaimed materials?			

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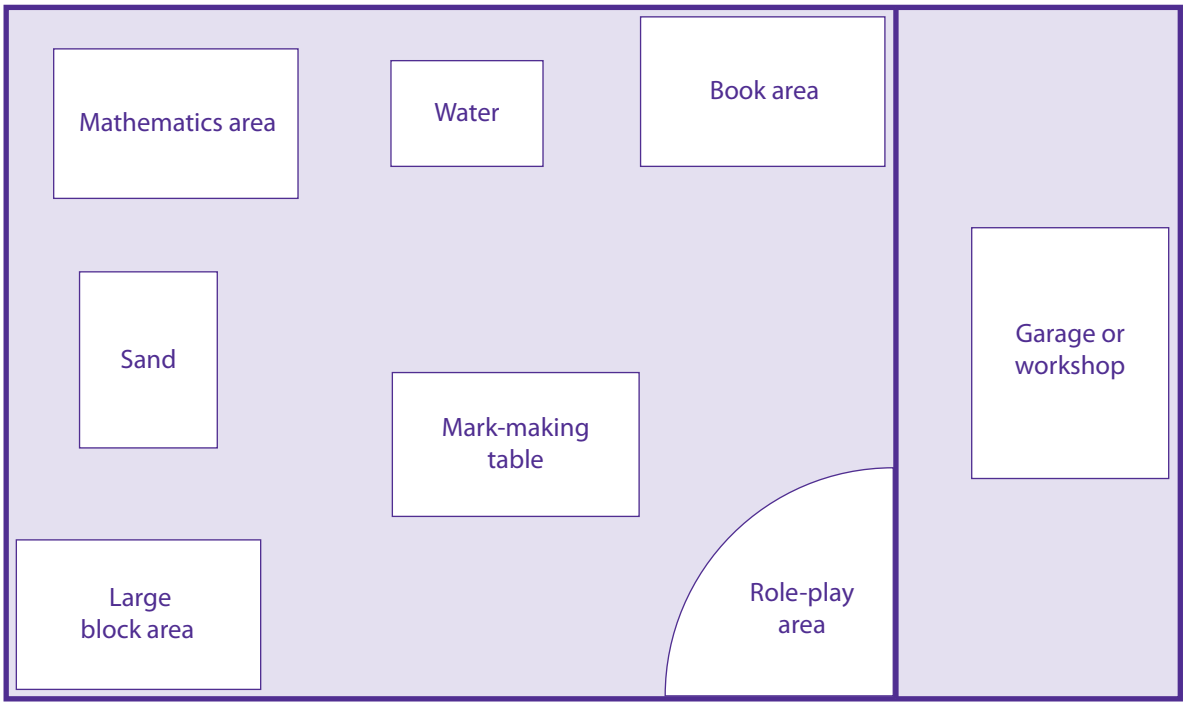
Auditing the use of the environment to support and develop mathematical speech, language and communication

The environment plays a key role in supporting and extending children's development and learning. The following audit has been adapted from the 'Enabling environment' advice within the *Every Child a Talker: Guidance for Early Language Lead Practitioners* publication (Ref: 00854-2008DOM-EN, page 15). It is intended to help practitioners to think about how their learning environment supports the development of mathematical speech, language and communication.

Core activity

Make a sketch of the layout of your setting, including both indoor and outdoor space. For example:



Think about places in the setting where good mathematical talk takes place. Take a red pen and mark with a cross where the mathematical talk 'hotspots' are: places where adults and children engage in conversation or where children talk to each other about mathematics. Add one cross if talking takes place there sometimes, and more crosses if it takes place there frequently.

Take a blue pen and mark with a circle the places where you think talking about mathematics could take place but currently does not.

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Outcomes

Now write a list of the places where there are currently missed opportunities for talk about mathematics to take place.

Next steps

Focus on the areas where there are currently missed opportunities for talk about mathematics to take place. Consider what could be done to the environment to enhance these opportunities. For example, if there are missed opportunities in the indoor large block area you could consider adding:

- laminated photographs of buildings from the local environment
- laminated photographs of constructions children have made
- books about buildings and shapes
- laminated 2-D card shapes
- laminated numerals and positional words
- clipboards and pens with squared and plain paper
- key vocabulary, laminated as prompts for adults.

If there are missed opportunities outdoors in the garage or workshop you could consider adding:

- telephones or mobile phones
- address and phone books
- bags, shopping bags, purses and coins
- note-pads and assorted markers
- picture books and story props to support mathematics
- notice boards
- postcards and envelopes
- photographs of children talking or making constructions or patterns
- number plates.

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Extracts from *Mark Making Matters: Young children making meaning in all areas of learning and development* (Ref: 00767-2008BKT-EN)

Problem solving, reasoning and numeracy

The Williams Review makes the very valid point that practitioners will generally give more attention to children's early writing than to their mathematical graphics, and that 'emergent writing' is now a well-recognised term. The review identifies the need to strengthen mathematical pedagogy so that children's natural interest in numeracy, problem-solving, reasoning, shape and measures can be fostered.

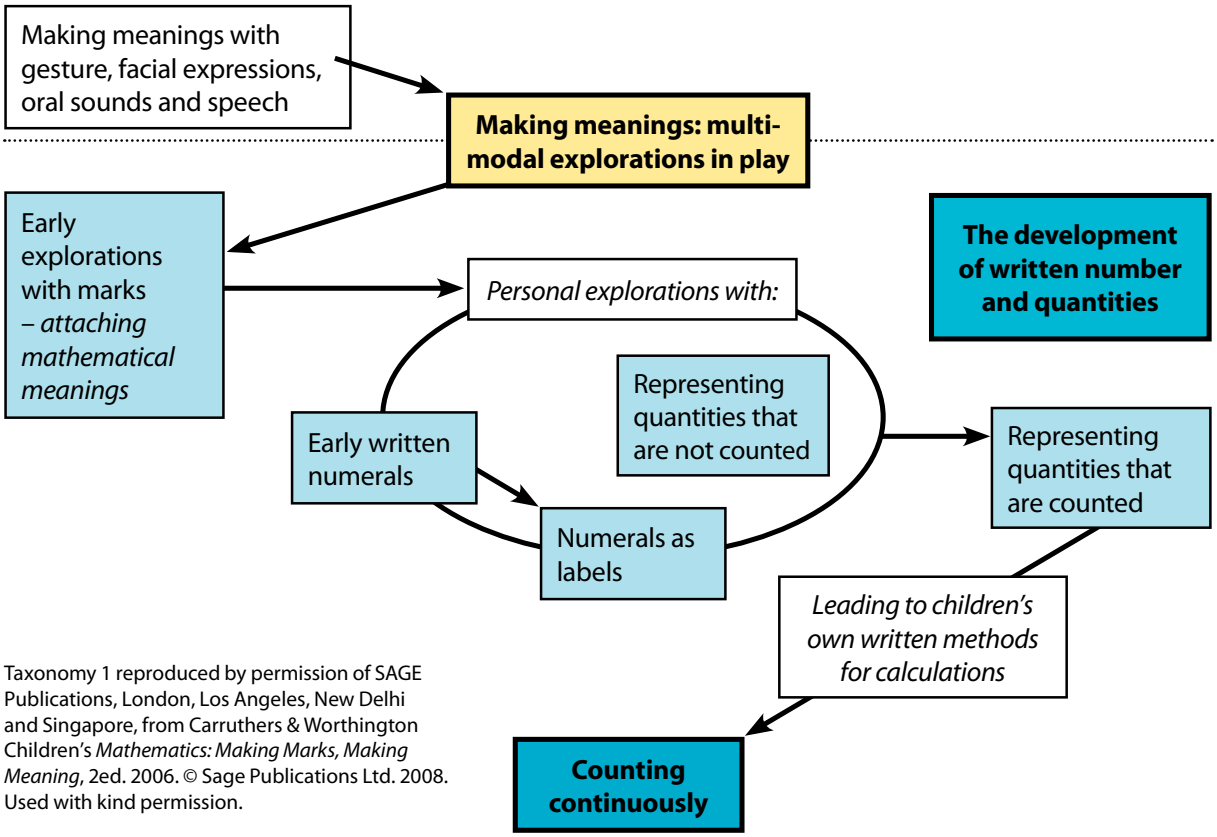
Children's mathematical mark making

Elizabeth Carruthers and Maulfry Worthington explain how children use their marks and representations to support their thinking:

> *Children's mathematical graphics begin in play and support their developing understanding of the standard abstract written symbolism of mathematics*.

Children choose to use their own mathematical graphics to represent their mathematical thinking; in a sense they are thinking on paper. Children, when given the opportunity, will choose to make mathematical marks, which can include scribbles, drawing, writing, tallies, invented and standard symbols. Just as in children's early writing, there is also a development in children's early mathematical marks (see Carruthers and Worthington taxonomy, 2007).

> Carruthers and Worthington's taxonomy (1): the development of children's mathematical graphics – beginnings in play



Taxonomy 1 reproduced by permission of SAGE Publications, London, Los Angeles, New Delhi and Singapore, from Carruthers & Worthington Children's *Mathematics: Making Marks, Making Meaning*, 2ed. 2006. © Sage Publications Ltd. 2008. Used with kind permission.

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The taxonomy above charts the development of children's mathematical graphics from their earliest explorations with marks in play as they explore number and quantities.

The child develops in their own way, but will exhibit these aspects of making meaning through play, leading to their own and eventually recognised written methods of calculation.

The pedagogy of children's mathematical marks

The following elements are essential to support children's mathematical marks:

- an environment that gives children many opportunities to explore mark making;
- assessment that is positive and responsive to children's marks and informs the next steps of learning;
- adults that model mathematics in meaningful contexts;
- adults that understand and can therefore value children's marks.

It is crucial that practitioners understand that children's mathematical mark making often arises spontaneously through a need to communicate in a meaningful context. Through their marks, children's thinking becomes visible and practitioners then gain valuable insights into their developing understanding of complex concepts. When children are asked to record, after they have finished a practical mathematics activity, motivation and meaning are often lost. Recording may then lack in-depth quality of thinking and is more like copying. Children's mathematical graphics are their own personal response to meaning making and involve deep levels of thinking.

It is important that children make links between the spoken and written representations.

Experiences and resources to support mark making

The following suggested experiences and resources will support practitioners in making sure that a good range of mark-making experiences, tools and resources are available, both as part of continuous provision and as provocations for new thinking.

Inside experiences

Registers – self-registration marks

Name writing – different purposes

Diaries and calendars – recording significant events

Telephone/address book – recording phone numbers and addresses

Cooking – writing recipes and ingredients, providing scales, clocks and timers to record weight, volume and time

Dance – making marks to music, ribbons on sticks

Office – taking messages, signing in or out

Art area – collages, painting, gluing, using clay

Quiet area – pads, paper and pens to record feelings

Graphics area – different types of paper, diaries, letters, envelopes and stamps, postcards, invitations, tickets, maps, plus opportunities for recording counting, measuring, calculating and quantities

Recording measurements in big block area

Music area – recording the beat, length of sounds

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Whiteboards in group areas – registration, names, recording counting and calculations

Role-play area, for example, shoe shop – filling in slips and order forms, shoe sizes on boxes

Small-world area – drawing maps, roads, homes, directions

Outside experiences

Big chalks on floor

Mud and twigs of different lengths and sizes

Sensory play – making marks on builders' trays in different textures

Playhouse with pads, paper, books

Gazebo – clipboards and paper, envelopes

Fabric sheets – with mud, sticks of different lengths and widths

Maps – huge sheets, fat felt pens

Spray painting – water sprayers

Picnic table covered in large sheets of paper

Rolls of paper on the floor

Mark-making trolley – variety of equipment, different shapes and sizes

Forest area, making marks with sticks in the mud

Garage area, filling in slips, recording findings

Resources and equipment

Paper

Unlined paper – assorted sizes, shapes, colours, textures and types

Cardboard – assorted colours, textures and thickness

Music paper, graph paper, lined, plain

Pads, notebooks, envelopes (used and unused), stamps (used, real)

Sticky notes and labels

Address books, diaries, registers, spiral-bound notebooks

Tools

A range of writing tools of different thicknesses – multicoloured pens, markers, crayons, writing pencils, coloured pencils, felt tip pens, gel pens and biros

Pencil sharpeners

Stampers and ink pads

Staplers

Hole punchers

Rulers and scissors

Clay tools

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A range of paints including watercolours, inks and dyes, gouache, block, powder and poster paint – and palettes to give children opportunities to mix their own colours

A range of brushes of varying sizes (big, small, fat, thin, square-tipped or pointed) and painting implements including rollers, sponges, stamps

A range of fixing materials – sticky tape, glue, glue sticks, stapler, paper clips, treasury tags, masking tape, string, wool

Examples of environmental print – notes, timetables, adverts, leaflets, junk mail

Ready-made books – zigzag, stapled and stapleless

Message and display boards/communication pockets (at child height for children to use independently)

Clipboards, whiteboards and blackboards (a range of sizes, both fixed and portable)

Name cards and number lines

Role-play

Pots of pens and pencils

Diary or calendar

Calculator

Notebook

Sticky notes and sticky labels

Forms and junk mail

Variety of paper, envelopes, postcards and greetings cards

Noticeboard

Phones – mobile and landline (non-functional and toy) – and phone book/address book

Construction area

Paper – large rolls and sheets to support planning and designing

Range of pens and pencils

Clipboards

Plans and diagrams

Noticeboard

DIY catalogues and order

Natural materials – sand, mud or clay

Range of plastic grouting tools

Lolly sticks

Twigs

Feathers

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Water play

Buckets of water and a range of tools, including paintbrushes, rollers, artists' brushes, sponges and dish mops

Colouring or glitter to add to water

Collections of containers for squirting or pouring

Garden hose and clear plastic tubing

Malleable play

Variety of substances – cornflour, non-allergenic shaving foam, crazy soap, dough, clay

ICT

Overhead projector – variety of transparent, translucent and opaque objects in a variety of colours; transparency paper and overhead or dry-wipe pens

Photographs – speech bubbles, think bubbles, captions, living books, speaking books

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Extracts from *Children thinking mathematically: PSRN essential knowledge for Early Years practitioners* (Ref: 00861-2009BKT-EN)

What are children's mathematical graphics?

The term *children's mathematical graphics* was originated by Carruthers and Worthington (2003). It is used to describe children's own marks and representations that they use to explore and communicate their mathematical thinking. Research into *children's mathematical graphics*, (Carruthers and Worthington, 2006) has revealed young children's development of their early mathematical thinking as they explore the symbolic 'written' language of mathematics. These graphics include: scribble-marks, drawings, writing, tally-type marks, and invented and standard symbols including numerals. Young children's graphical exploration 'builds on what they already know about marks and symbols and lays the foundations for understanding mathematical symbols and later use of standard forms of written mathematics', Carruthers and Worthington (2006).

The EYFS PSRN emphasises that practitioners should:

'Value children's own graphic and practical explorations of problem solving' and observe 'the context in which young children use their own graphics.'

What do children's mathematical graphics look like?

Children's mathematical graphics support their developing mathematical thinking, and the following three examples illustrate part of this continuous process, making visible the sophistication of children's creative approaches to problem solving, reasoning and numeracy. The first two examples show children representing their mathematical thinking as they count. The third example shows how Kamrin, an older child, still uses his own more-complex graphics to help him reflect and work on a mathematical problem concerning division.

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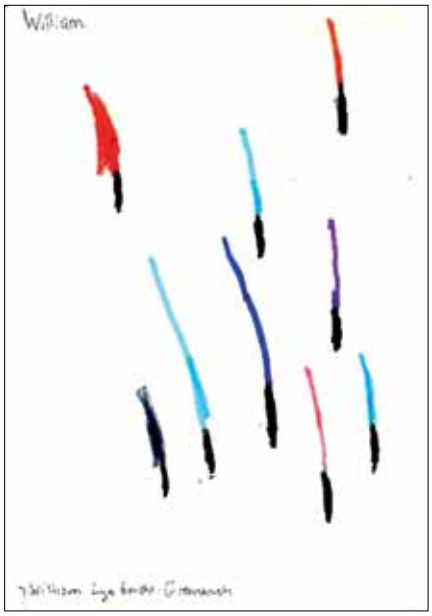

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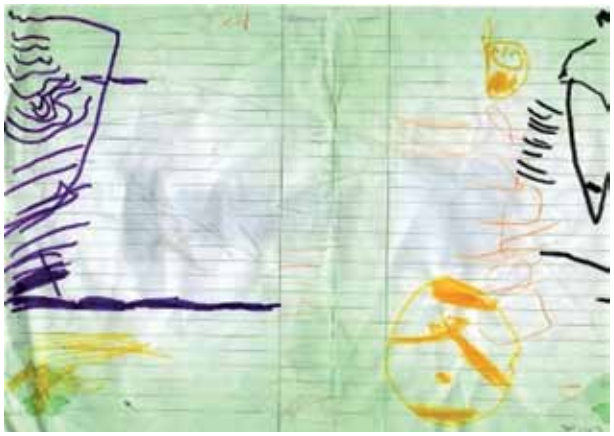
William's 'light sabres'

William (4 years 6 months) is fascinated by *Star Wars* and often plays out various scenes with his friend. He has drawn a light sabre for each of his favourite characters from the *Star Wars* film. The colours are important; for example, red is for 'Darth Maul'. His teacher explained, 'William draws hundreds of these pictures at the moment – either of light sabres or bows and arrows from the *Lord of the Rings* – they seem to be linked to his fascination with counting or amounts and he will count all sorts of objects, again and again'.



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Chloë's register

Five-year-old Chloë has brought her own exercise book from home and says she is 'making register'. She has written the children's names down (the squiggles on the left) then counted them to see if she's made the right number of marks. She has counted to 4 and then counted random numbers to 20. She has used number strips to check and count how many children were in the class and decided to use tally-type marks to represent the number of children who were away. Chloë has a severve speech and language disorder. Her own choice to make a register encouraged her to communicate her ideas in an alternative way. Her teacher was delighted with this, and also that Chloë wanted to explain what she had done.

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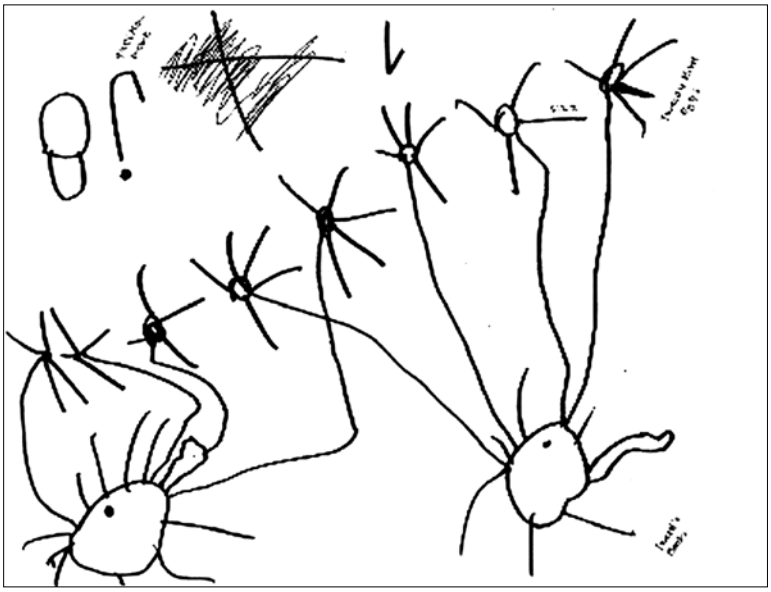

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Kamrin – 'Can 8 be shared equally between 2?'

Kamrin (5 years 7 months) invented his own way of checking if his chosen number, 8, could be shared equally between two. In this example he wrote '8?' and then added a cross to show that he thought it could not. On reflection he invented 'tweedle birds', giving each in turn a tweedle bird egg until he had shared the 8 eggs.
Finally he scribbled over the cross he'd first written and added a tick to confirm that 8 could be shared equally.

Why are children's mathematical graphics important?

Young children need opportunities to develop their own understanding of the abstract written language of mathematics. The EYFS emphasises the importance of 'building on what young children already know and understand' and this is especially important for 'written' mathematics.

Through their own *mathematical graphics*, young children build on their understanding of how they can use their marks, symbols and drawings to represent their thinking. In a sense they are representing their mental mathematics on paper. Children's explorations with their *mathematical graphics* in play also underpin and support their 'written' calculations. Calculation is a complex undertaking and counting lays the foundations of this process. Children's understanding of written mathematics flourishes if they are encouraged to represent their own mathematical thinking when they are unable to work something out mentally. This also helps them work out their own strategies for solving problems.

Practitioners need to share *children's mathematical graphics* with parents and support them to develop an understanding of the important part that they play in children's mathematical development.

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What's the difference between 'recording mathematics' and 'children's mathematical graphics'?

Understanding *children's mathematical graphics* is to recognise the difference between children *recording* a piece of mathematics after they have already done the maths, as opposed to children *representing* their own mathematical thinking in contexts that are relevant and meaningful to them.

When children are asked to simply *record* mathematics after they have worked something out (perhaps using practical resources such as little plastic bears), there is little scope for supporting or extending their mathematical thinking. In contrast, when children are encouraged to *represent their mathematical thinking* as they go along in contexts that are meaningful to them, they are able to use higher-level thinking skills (see Carruthers and Worthington, 2008).

When mathematical experiences are rooted in children's individual interests and fascinations, it increases their engagement, motivation, and desire to learn. This deepens their understanding of the abstract written language of mathematics, including calculations, and supports all aspects of problem solving. By having opportunities to represent their thinking as they explore and make meanings through their play, children's confidence in themselves as mathematical problem solvers and thinkers flourishes.

Key attributes of *children's mathematical graphics* include:

- children making their *own* choice to represent their mathematical thinking
- children making their *own* meanings – both independent and co-constructed (rather than copied)
- children's *own* graphics (drawings, writing, symbols, marks)
- children's *own* layouts
- children challenging themselves as they explore their mathematical thinking and meanings, communicate their ideas and solve problems.

  'For children to become (young) mathematicians requires creative thinking, an element of risk-taking, imagination and invention – dispositions that are impossible to develop within the confines of a work-sheet or teacher-led written mathematics.'

  Carruthers, E. and Worthington, M. (2003) 'Research uncovers Children's creative mathematical thinking, Primary Mathematics, Vol. 7/3 (Autumn).

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Why is play so important?

Children's mathematical graphics begin in their imaginative play, as they explore, make and communicate their personal meanings. This is often referred to as 'symbolic play' since children use actions, speech or resources (for example, junk materials) as symbols or signs to mean something specific. For example, in role-play Jemima pretended that a flat stone with grass and gravel was a plate with 'dinner'.

Often, between the ages of 3 and 4 years, children begin to attach mathematical meanings to some of their marks and representations, using their marks as symbols to think about quantities and numerals.

Children use their own symbols in flexible ways: This helps them understand that written symbols can be used to carry different meanings for different purposes. The following examples show children's flexible use of signs (crosses).

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Jazper (4 years 0 months) has used a cross to represent an aeroplane (drawing).

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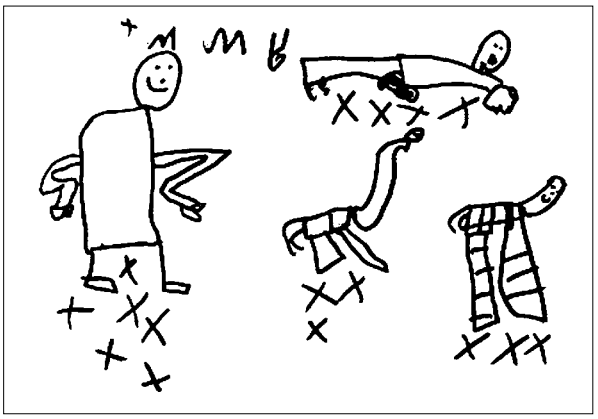
Mark (3 years 9 months) writes these crosses to say 'No! Keep out!' (as 'writing').



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Tommy uses crosses to show which animal each of his friends liked best (mathematics: collecting data).

Tommy's class had been on a visit to the zoo and were arguing about which the 'best' animal was. Tommy (4 years 7 months) decided to ask his friends, and after he'd drawn a lion, a crocodile, a giraffe and a zebra, went with his clipboard to collect his data. The choice of crosses was his idea.

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Keeping scores

Several Reception class children had chosen to play ball, taking turns to throw it into a net. One child decided to keep a count of his scores on paper on a nearby easel, and wrote his name to show that he had scored one goal. Others joined in, representing their scores by writing the quantity they had, such as '3', '4', '5' or '1'. Some wrote tallies and Ellie wrote her name twice, to signify 'two goals scored'. Rakeem (5 years 1 month) had his own ideas and drew a Christmas tree in a pot with a circle around it, to show the single goal he had just scored. Jody (4 years 11 months) was intrigued by Rakeem's idea and when she scored two goals Jody decided to also draw a Christmas tree but this time, drew two pots beneath it as her personal sign for '2 goals'.

> 'The foundations of early written mathematics begin in children's make-believe play, for it is here that children begin to understand the relationship between meanings and symbols.'
>
> **Carruthers, E. and Worthington, M. 'Children's mathematical graphics: young children calculating for meaning' in Thompson, I. (Ed.) (2008) *Teaching and learning early number*.**

Supporting children's mathematical graphics

The recent publication *Progress Matters* emphasises that 'children should be supported to pursue their unique paths in their learning and development' (DCSF, 2009b). *Children's mathematical graphics* are diverse, creative and individual, and if practitioners are to support and extend children's mathematical thinking they first need to understand it, tuning into their play, observing, listening and, if appropriate, joining in.

Practitioners will need to review the learning environment, inside and out, to ensure that children are experiencing rich, play-based contexts for problem solving, reasoning and numeracy. A range of mark-making resources should be freely available so that children can make choices about how they represent their thinking, depending on the mathematics in which they are involved at the time.

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Practical pedagogical points to support children's mathematical graphics

- Tune into and value children's own meanings.
- Value *children's mathematical graphics*.
- Discuss the *children's mathematical graphics* with them to help them reflect on the meanings of their own and other children's graphics.
- Observe closely and annotate *children's mathematical graphics*; this will allow adults to uncover children's thinking and meanings sensitively.
- Model *mathematical graphics* indirectly – it is important for children to see different ways to represent mathematical thinking.
- Create a culture in which children use graphical media independently throughout the environment and make a wide variety of papers, pens, pencils and other mark-making equipment, easily accessible in all areas of provision, indoors and outdoors.

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Acknowledgements

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