

# Woodthorne Primary School

## Pre-Calculation Policy



Mathematics is one of the four specific areas, through which the three prime areas are strengthened and applied. Developing a strong grounding in Number is essential so that all children can develop the necessary building blocks to excel mathematically. By referring to the Pre-Calculation policy children will develop a secure base of knowledge from which mastery of mathematics is built. Practitioners will focus on the characteristics of effective teaching and learning:

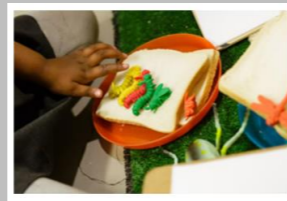
- Playing and exploring
- Active Learning
- Creating and thinking critically



Cardinality and Counting (A)



Comparison (B)



Composition (C)






Pattern (D)

Addition

Subtraction


Multiplication

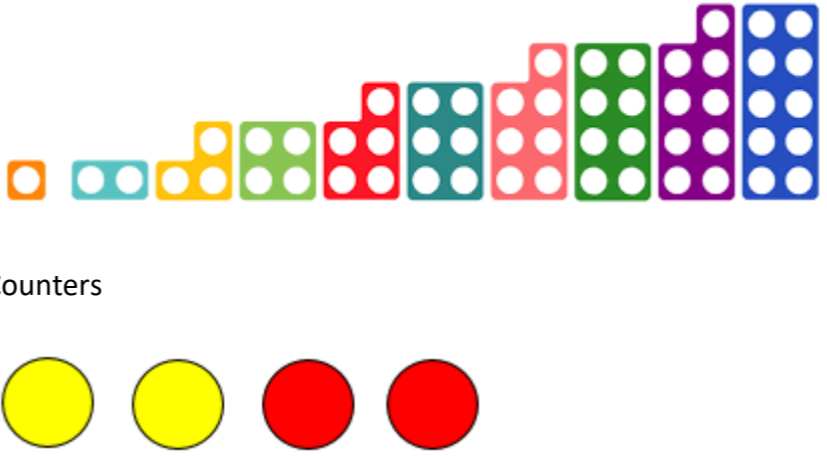
Division

<p><b>Two's Provision</b></p>	<ul style="list-style-type: none"> <li>• Begins to become aware of number names through their enjoyment of action rhymes and songs that relate to numbers</li> <li>• Looks for things which have moved out of sight</li> <li>• Says some counting words</li> <li>• May engage in counting-like behaviour, making sounds and pointing or saying some numbers in sequence</li> <li>• Uses number words, like one or two and sometimes responds accurately when asked to give one or two things</li> <li>• Begins to say numbers in order, some of which are in the right order (ordinality)</li> <li>• In everyday situations, takes or gives two or three objects from a group</li> <li>• Beginning to notice numerals (number symbols)</li> <li>• Beginning to count on their fingers.</li> </ul>	<ul style="list-style-type: none"> <li>• Responds to words like lots or more</li> <li>• Beginning to compare and recognise changes in numbers of things, using words like more, lots or 'same'</li> </ul>		<ul style="list-style-type: none"> <li>• Joins in with repeated actions in songs and stories</li> <li>• Initiates and continues repeated actions</li> <li>• Becoming familiar with patterns in daily routines <i>e.g. Highlight different times of the day and talk about what comes next within the pattern of the day.</i></li> <li>• Joins in with and predicts what comes next in a story or rhyme <i>e.g. Leave a space for children to do the next action or word in familiar songs and stories with repeating elements.</i></li> <li>• Beginning to arrange items in their own patterns, <i>e.g. lining up toys</i></li> <li>• Joins in and anticipates repeated sound and action patterns <i>e.g. Plan opportunities for children to experience pattern such as percussion, music and action games that involve repeated sounds or actions.</i></li> <li>• Is interested in what happens next using the pattern of everyday routines</li> </ul>	<p>Throughout the suggested activities, expose children to the following manipulatives in order to support conceptual understanding.</p> <p>A range of real life objectives</p>   <p>Numicon</p> 		
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	<p><b>Suggested Activities</b></p> <ul style="list-style-type: none"> <li>• (A) During personal care, routines make a point of using numbers. <i>E.g. ?</i></li> <li>• (A) Play peek-a-boo hiding games with toys and people.</li> <li>• (A) Model counting things in everyday situations and routines.</li> <li>• (A) Take opportunities to say number words in order with children as they play, <i>e.g. 1,2,3 go!</i></li> <li>• (A) Use number words in meaningful contexts, <i>e.g. Here is your other mitten. Now we have two.</i></li> <li>• (A) Include the number sequence in everyday contexts and songs so children experience the order of the numbers (ordinality)</li> <li>• (A) Use opportunities to model and encourage counting on fingers.</li> <li>• (A) Point out the number of things whenever possible, <i>e.g. rather than just chairs, say four chairs.</i></li> <li>• (A) Encourage children to use marks to represent their mathematical ideas in role play, indoors and outdoors.</li> <li>• (A) Help children to give or get two or three items, <i>e.g. during snack time help children to take two pieces of fruit.</i></li> </ul>
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- (A) Sing counting songs and rhymes, which help to develop children’s understanding of number.
- (A) Say the counting sequence going to higher numbers, in a variety of contexts, indoors and out, and sometimes counting backwards.
- (B) Talk with young children about lots, more and not many and not enough as they play. *E.g. Provide varied sets of objects for playful opportunities for children to independently explore lots, more, not many and not enough.*
- (B) Encourage children to explore the collections they make, comparing amounts and counting some of the items, emphasising the last number, *e.g. 1,2,3. There are 3 leaves.*
- (D) Talk about patterns in the environment *e.g. spots and stripes on clothing or bumps in the pavement.*
- (D) *Spot opportunities to play “back and forth” and repetitive “again” games. E.g. ?*
- (D) *Provide items for children to make repetitive sounds.*
- (D) Comment on what is the same and what patterns are repeated in the environment.
- (D) Plan to share stories and songs that contain repeated elements, which help children to anticipate what might come next.
- (D) Talk with children about the patterns you notice around you.
- (D) Comment on and help children to recognise the patterns they make in their mark making, loose parts and construction.
- (D) Draw children’s attention to the patterns in their routines by asking what comes next.
- (D) Provide a range of natural and everyday materials, as well as blocks and shapes, with which to make patterns.
- Draw attention to contrasting differences and changes in amounts *e.g. adding more bricks to a tower*
- Sing number rhymes, using actions and appropriate props *E.g. five little ducks, five currant buns.*
- Draw attention to contrasting differences and changes in amounts *e.g. eating things up.*
- When singing number rhymes with props, draw attention to contrasting differences and changes in numbers, checking together *How many now?*
- Play hiding games so children notice that something has gone.

<p>Nursery</p>	<ul style="list-style-type: none"> <li>• Enjoys counting verbally as far as they can go by pointing or touching (tags) each item, saying one number for each item, using the stable order of 1,2,3,4,5.</li> <li>• Uses some number names and number language within play, and may show fascination with large</li> </ul>	<ul style="list-style-type: none"> <li>• Compares two small groups of up to five objects, saying when there are the same number of objects in each group, <i>e.g. You’ve got two, I’ve got two. Same!</i></li> </ul>	<ul style="list-style-type: none"> <li>• Through play and exploration, beginning to learn that numbers are made up (composed) of smaller numbers</li> <li>• Beginning to use understanding of number to solve practical problems in play and meaningful activities</li> </ul>	<ul style="list-style-type: none"> <li>• Creates their own spatial patterns showing some organisation or regularity</li> <li>• Explores and adds to simple linear patterns of two or three repeating items, <i>e.g. stick, leaf (AB) or stick, leaf, stone (ABC)</i></li> <li>• Joins in with simple patterns in sounds,</li> </ul>	<p>Throughout the suggested activities, expose children to the following manipulatives in order to support conceptual understanding.</p> <p>Cubes</p>  <p>Numicon</p>
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<p>numbers <i>e.g. Enjoys counting forwards and back (sometimes to much higher numbers). Use different voices, e.g. high or growly.</i></p> <ul style="list-style-type: none"> <li>• Begin to recognise numerals 0 to 10</li> <li>• Subitises one, two and three objects (without counting)</li> <li>• Counts up to five items, recognising that the last number said represents the total counted so far (cardinal principle)</li> <li>• Links numerals with amounts up to 5 and maybe beyond</li> <li>• Explores using a range of their own marks and signs to which they ascribe mathematical meanings</li> </ul>		<ul style="list-style-type: none"> <li>• Beginning to recognise that each counting number is one more than the one before</li> <li>• Separates a group of three or four objects in different ways, beginning to recognise that the total is still the same</li> </ul>	<p>objects, games and stories dance and movement, predicting what comes next</p>	 <p>Counters</p>
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<p><b>Suggested activities</b></p> <ul style="list-style-type: none"> <li>• (A) Use opportunities within daily routines to support children’s developing sense of number.</li> <li>• (A) Model and encourage counting and representing numbers within role play, <i>e.g. making a telephone call using a list of numbers.</i></li> <li>• (A) Value children’s own mathematical representations within their pretend play.</li> <li>• (A) When counting with children, playfully make deliberate mistakes for fun, expecting children to correct them.</li> <li>• (A) Model writing numerals, e.g. on badges, birthday cards and banners.</li> <li>• (A) When counting objects with children emphasise the cardinal principle: 1, 2, 3, there are three cups.</li> <li>• (A) Invite children to count out a number of things from a larger group, <i>e.g. Can you get five crackers?</i></li> <li>• (A) Encourage children to use their fingers to show an amount <i>e.g. when asking another child to share resources, to show on their fingers how many they need.</i></li> <li>• (A) Provide a numeral rich environment, <i>e.g. in roleplay areas, mud-kitchen recipes, numbers on trikes and toilet doors.</i></li> <li>• (A) Provide numerals that children can pick up and use within all aspects of their play and explore and talk about higher numbers both indoors and outdoors.</li> <li>• (A) Model using objects to illustrate counting songs, rhymes and number stories, sometimes using pictures and numerals, to enable children to use those resources independently.</li> <li>• (A) Play with either big dot or numeral dice. Discuss that six on the dice is worth more than four.</li> <li>• (A) Provide a variety of mathematical picture books.</li> <li>• (A) Explore different arrangements of the same number, <i>e.g. partitioning five in different ways; hiding one group and “guessing” the hidden number.</i></li> <li>• (A) Model counting items rhythmically, including objects into a container, claps or drumbeats.</li> <li>• (A) Support children to choose how to arrange collections of two, three and four objects in different ways.</li> <li>• (A) Provide spaces to display children’s ongoing mathematical thinking, <i>e.g. their own ways of representing their thinking, and scribing children’s words.</i></li> <li>• (C) Model wondering and talking about how you might solve a number problem.</li> <li>• (C) Value and support children to use their own graphics when problem solving.</li> <li>• (D) Whilst playing alongside children, model simple repeating patterns of two or three items and encourage children to create and continue patterns.</li> <li>• (D) Demonstrate arranging objects in spatial patterns when building, collaging or playing with loose parts.</li> <li>• (D) Draw children’s attention to patterns around them including from a range of cultures.</li> <li>• (D) When making patterns, help children to solve problems.</li> <li>• (D) Provide a range of items for free exploration of patterning indoors and outdoors including natural materials, pattern blocks, loose parts, mats, trays and strips.</li> <li>• (D) Encourage children to join in with body patterns or repeating sections of songs.</li> <li>• (D) Pause to encourage prediction when enjoying stories and rhymes with repeating elements, sometimes using props.</li> </ul>
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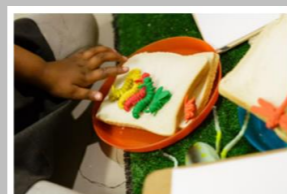
- (D) Emphasise the repeating pattern when turn taking.
- (D) Provide patterned resources including those representing a range of cultures, such as clothing, fabrics or wrapping paper.
- Emphasise the one more in rhymes and traditional tales, asking children to predict the next number.
- Emphasise the one less pattern in rhymes and traditional tales, asking children to predict the next number.
- Encourage children to share items between two people or toys e.g. ?



Cardinality and Counting (A)



Comparison (B)



Composition (C)



Pattern (D)

Addition

Subtraction

Multiplication

Division

**Reception**

- Enjoys reciting numbers from 0 to 10 (and beyond) and back from 10 to 0
- Increasingly confident at putting numerals in order 0 to 10 (ordinality)
- Engages in subitising numbers to four and maybe five
- Counts out up to 10 objects from a larger group
- Matches the numeral with a group of items to show how many there are (up to 10)

- Uses number names and symbols when comparing numbers, showing interest in large numbers
- Estimates of numbers of things, showing understanding of relative size

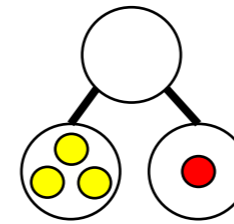
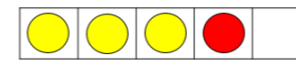
- Shows awareness that numbers are made up (composed) of smaller numbers, exploring partitioning in different ways with a wide range of objects
- Begins to conceptually subitise larger numbers by subitising smaller groups within the number, *e.g. sees six raisins on a plate as three and three*
- In practical activities, adds one and subtracts one with numbers to 10
- Begins to explore and work out mathematical problems, using signs and strategies of their own choice, including (when appropriate) standard numerals, tallies and “+” or “-“

- Spots patterns in the environment, beginning to identify the pattern “rule”
- Chooses familiar objects to create and recreate repeating patterns beyond AB patterns and begins to identify the unit of repeat

Adding numbers within 5

$$3 + 1 = 4$$

**Concrete**

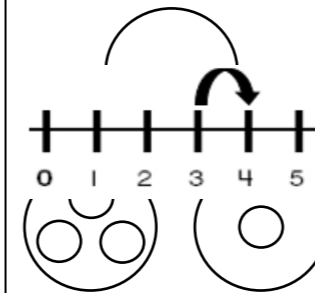


Combine both ‘parts’ to make the ‘whole’.



Place a counter on the number 3 and count on 1.

**Pictorial**



Touch count the counters and combine at the top.

**Abstract**

(mental strategy – counting on)  
‘Put 3 in your head and count on 1.’

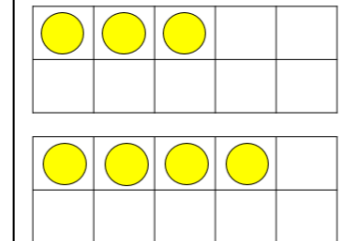
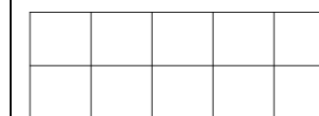
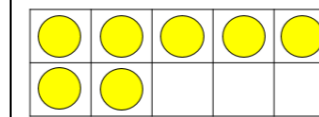
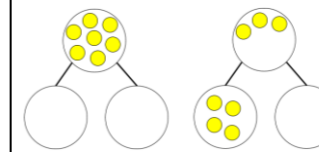
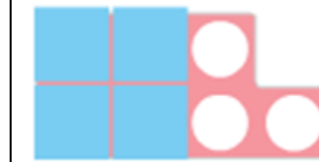
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Subtracting numbers within 5

Begin with subtracting from numbers less than 5 – follow the same process as outlined below.

$$7 - 4 = 3$$

**Concrete**



Place 7 counters on the tens frame and

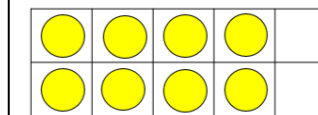
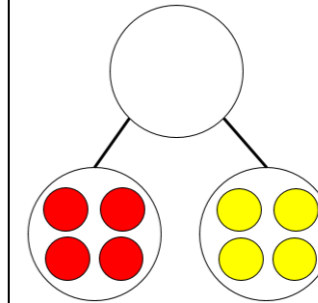


Place a counter on the number 7 and count back 3.

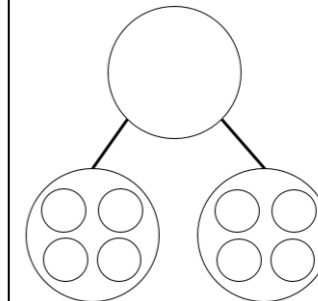
Doubling

**Double 4 is 8 or 4 + 4 = 8.**

**Concrete**

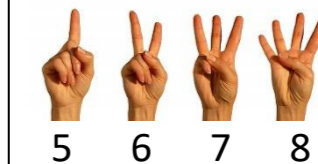


**Pictorial**



**Abstract**

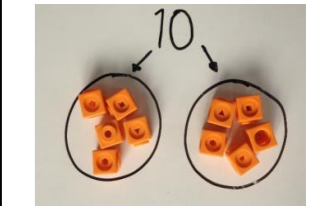
(mental strategy – counting on)  
‘Put 4 in your head and count on 4’



Halving

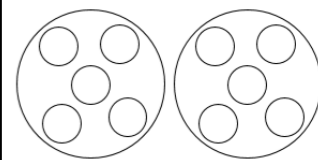
**Half of 10 is 5; Share 10 into 2 equal groups.**


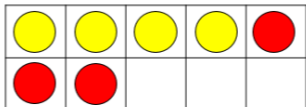


**Concrete**



Count how many are in each group = 5.

**Pictorial**



					 <p><math>3 + 1 = 4</math></p> <p>Adding numbers within 10.</p> <p><b><math>4 + 3 = 7</math></b></p> <p>Follow the same process as above.</p> <p>N.B. When using a tens frame, see the example below.</p> 	<p><b>Pictorial</b></p>  <p><b>Abstract</b> (mental strategy – counting back) 'Put 7 in your head and count back 4.'</p>  <p>6    5    4    3</p>	
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- Suggested activities
- (A) Play games such as hide and seek that involve counting, forwards and backwards.
  - (A) Discuss the order of numbers in context, e.g. finding a page number.
  - (A) Enjoy subitising games and sustained shared thinking about number, indoors and outdoors.
  - (A) Encourage cardinal counting by saying how many there are after counting (...6, 7, 8. There are 8 balls).
  - (A) In everyday activities, ask children to count out a number of things from a group (e.g. Could you get seven cups for snacktime?)
  - (A) Jump with children along a number track, counting each jump or counting on.
  - (A) Sing counting songs and count together forwards and backwards, sometimes starting from different numbers and in different step sizes. Discuss numbers coming before, after and between and stress patterns.
  - (A) Plan opportunities to order mixed-up numerals.
  - (B) Model comparing numbers in problems about fair shares.
  - (A) When counting groups as part of routines, e.g. self-registration with ten-frames, dinner chart etc., record the final total as a label for children to see.
  - (A) Subitise with children, talking about how they see numbers of things made up in a variety of arrangements (e.g. recognising odd and even numbers).
  - (A) Build counting and ways of representing numbers into everyday routines.
  - (A) Provide opportunities for children to match a number of objects to the numeral, including zero, and display number lines to 100 at child height.
  - (B) Pose everyday estimation problems and establish mental estimation benchmarks, e.g. more or less than 10.
  - (C) Talk with children about the strategies they have used to solve a problem. Spot opportunities to playfully pose composition problems for children to explore.
  - (C) Talk to children about the marks and signs they use to represent and communicate their thinking. As appropriate, model and discuss informal and standard ways (e.g. using arrows, plus and minus signs).
  - (C) Begin to model calculations in mathematical stories and number rhymes and in real contexts, using a range of ways of representing (e.g. five-frames). Use both informal and standard ways to record these, including tallies and symbols. Discuss children's own graphical strategies to solve problems, using some vocabulary of addition and subtraction.
  - (D) Encourage children to notice and appreciate a range of patterns involving repetition and symmetry in the environment, including traditional patterns from a range of cultures.
  - (D) Model using symbols to represent a pattern in other ways (e.g. using a spot/cross/dash pattern of symbols and doing a twirl/jump/glide in response).
  - (D) Make deliberate mistakes when creating patterns alongside children and playfully challenge them to fix the problem.
  - (D) Make border patterns where the repeating pattern continues around an object or frame.
  - (D) Provide opportunities for printing patterns using a variety of objects.
  - (D) Using photos, challenge children to copy and continue patterns.
  - (D) Invite children to create a pattern with the same structure using different objects (e.g. instead of a red/blue/blue pattern, create a sheep/cow/cow pattern).
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- Encourage children to make predictions and visualise the outcome in stories, rhymes and songs if one (or two) is added or taken away.
  - Involve children in voting, e.g. for books to read at story time, using linking cubes with children's names on.
  - Discuss examples and display large numbers including hundreds, thousands and a million.
  - Set up an estimation station where everyone records guesses; later count and order the guesses.
  - Provide numeral cards for children to order on a washing line.
  - Play subitising games which involve quickly revealing and hiding numbers of objects, perhaps showing numeral cards and fingers.



- Drop marbles into a tin and ask the children to listen (without looking) to count how many there are.
- Provide dice, board and card games, sometimes involving older children, families and members of the local community.
- Provide resources to make “staircase” patterns which show that the next counting number includes the previous number plus one.
- Display children’s mathematical representations, including explanations of the children’s meaning making.