

## Focus on the Numicon 10s Number Line

Empty number lines are an important support for modelling mathematical thinking, however before children can use them successfully they need to understand the cardinal and ordinal value of numbers in relation to each other and have had lots of experience finding numerals on a variety of filled number lines and number tracks.

The Numicon 10s Number Line can be a useful step towards teaching children about empty number lines, since only the multiples of 10 are marked. Here are the key activities taken from Numicon Kit 1 and 2, which feature the 10s Number Line to support number understanding and mental calculation for place value, rounding, addition and subtraction, pattern, multiplication and division. There are many other opportunities for children to work with the 10s number line in the Numicon teaching programme so please refer to the relevant teaching file.



## Kit 1, Number and the Number System 4b

**Title:** To find the position of numbers on number lines

**Key Mathematical Idea:** Counting, Place Value, Pattern

**Activity 1:** (in brief) Creating a 10s number line with Numicon Shapes and finding the position for any given '10s' number.

Key mathematical idea: Counting, Place value, Pattern

Kit 1: Numbers and The Number System 4B

To find the position of numbers on number lines

### Aims

- To introduce the Numicon Tens Number Line.
- To know where to find numbers on the 0-100 Number Line.

### Language

- tens, number names to 100, find, along, before, after, between

### Activity 1

#### Step 1

- Teacher draws an empty number line on a long sheet of paper and marks 0.

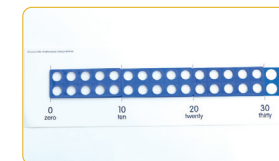
- Teacher starts to construct a tens number line by placing a 10-shape from 0, and marking where 10 is reached on the line.

#### Step 2

- Teacher and children complete the number line by placing 10-shapes along the line, marking and writing each tens number up to 100.

#### Step 3

- Teacher now shows children the Numicon Tens Number Line. Children count in tens while teacher places a 10-shape on the line as the children say each number.



### Activity 2

#### Step 1

- Teacher asks children to place one 10-rod along the 0-100 Number Line and at the same time places the 10 Card from the 0-100 Pack under the 10.

#### Step 2

- Children continue placing 10-rods along the Number Line with Cards under each tens number.



### Step 3

- Teacher asks children to find various numbers on the Number Line, (start with the 10's numbers, then those ending in '5', then those ending in '9' or '1').

### Use it!

#### Mental arithmetic

- Teacher says numbers. Children find them on Number Lines.

#### Independent practice

- Children draw an empty number line and mark all the tens numbers.

- Game for 2 players – Have ready Tens Number Line, ten 10-shapes, tens Cards (from the 0-100 Pack) shuffled and face down.

- Player 1 turns a Card.
- Player 2 builds the number with 10-shapes.
- Player 1 checks by placing 10-shapes along the Number Line.

- Game for 2 players – Have ready Tens Number Line, 0-100 Number Line, 10-shapes, 10-rods, tens Cards (from 0-100 Pack) shuffled and face down.

- Player 1 turns a Card and places it face up on the table.
- Player 1 builds the number with Shapes and places them on Tens Number Line.

- Player 2 builds the number with Rods and places them on 0-100 Number Line.

- Both players check they have reached the same tens number.
- Play continues with players taking turns to turn Cards.

### Key question for assessment

- Can children go to the right part of the Number Line to find a number?

### Kit 1 Calculating 13A

**Title:** Bridging through 10 using addition of a single digit

**Key Mathematical Idea:** Addition

**Activity 1:** (in brief) Using the 10s number line to add together 2 numbers that bridge a multiple of ten

### Kit 1, Calculating 13B

**Title:** Bridging through 10 using subtraction of a single digit

**Key Mathematical Idea:** Subtraction

**Activity 1:** (in brief) Using the 10s number line to subtract a number that bridges a multiple of ten.

### Kit 2, Using pattern 7

**Title:** Patterns/sequences of numbers

**Key Mathematical Idea:** Pattern

**Activity 2:** (in brief) Counting forwards and backwards in tens from any given number

**Key mathematical idea** Addition Kit 1 Calculating 13A

**Bridging through 10 using addition of a single digit**

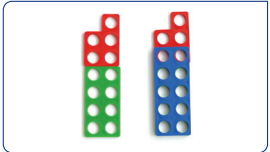
**Aim**  
→ To learn how to 'bridge' using 5, 6, 7, 8 and 9 (initially to 20, extending to 100).

**Language**  
equal to, add, plus, how many more, how many left, left over


**Activity 1**

**Step 1**  
Teacher shows children an 8-shape and a 5-shape and tells children 'we are going to find out how we can use addition facts we know, to help us add 8 and 5'.


**Step 2**  
Teacher places the 5-shape above the 8-shape and then places a 10-shape on top, covering the 8 + 2, therefore showing  $8 + 5 = 13$ .



**Step 3**  
Teacher points to the 5-shape and says 'we used 2 of the 5 to make 10 which left 3'. Teacher moves the 5 to the side and replaces it with a 2-shape and a 3-shape.



**Step 4**  
Teacher places the 8-shape and 5-shape along the Tens Number Line to show 13, reminding children that they are using 2 of the 5 to make 10, and the 3 left makes the total 13.



**Step 5**  
Repeat with  $8 + 6$ ,  $8 + 7$  and  $8 + 9$ . (Children may suggest using near doubles.)

**Use it!**

**Mental arithmetic**  
Teacher holds up any two Cards which total either 5, 6, 7, 8 or 9 and asks children to say the answer. Repeat several times so children practise all these facts.

**Independent practice**  
For children working in pairs – Have ready Numeral Cards 6 – 10 shuffled and face down, 5, 6, 7, 8 and 9-shapes.

- Children take a Card and a Shape. In order to add the value of the Shape to the number on the Card, children may mentally partition the Shape, say the number needed to reach 10, and then say the number to be added to 10 to give the answer.

**Extension**  
Repeat the above activity using Numeral Cards showing higher numbers that end in 6, 7, 8 or 9.

**Using and applying**  
Ask children word problems that use the bridging strategy.

**Key question for assessment**  
Can children explain how they will partition 8 to answer  $6 + 8 = \square$ ?

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**Key mathematical idea** Subtraction Kit 1 Calculating 13B

**Bridging through 10 using subtraction of a single digit**

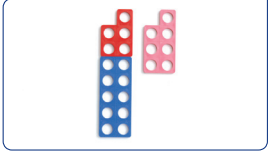
**Aim**  
→ To learn that 5, 6, 7, 8 and 9 may be bridged through 10 to solve subtraction problems.

**Language**  
equal to, subtract, minus, how many fewer, how many less, how many left

**Activity 1**

**Step 1**  
• Teacher builds 15 with a 10-shape and a 5-shape.  
• Teacher asks children "What shall we do to subtract 7?" and shows children the 7-shape.

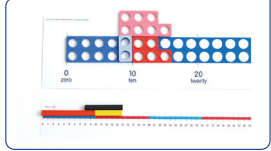
**Step 2**  
• Teacher says "If we take away the 5 first because that's easy, how many of the 7 will be left?"  
• Teacher says "We subtracted 7 by taking away 5 and then 2", placing the 2-shape to cover 2 of the 10-shape.  
• Teacher asks children what they can see, (that the 8 pattern is left).



**Step 3**  
Teacher now repeats Steps 1 and 2 this time placing the Shapes along the Tens Number Line.

**Step 4**

- Repeat with other examples, subtracting 5, 6, 7, 8, and 9 from other suitable 'teen' numbers.
- Number Rods may also be used.



**Use it!**

**Mental arithmetic**  
Teacher holds up any two Cards from 1-9 and asks children to say the subtraction. Repeat several times so children practise all subtraction facts.

**Independent practice**  
For children working in pairs – Have ready Numeral Cards 11-15 shuffled and face down, 5, 6, 7, 8 and 9-shapes.

- Children take a Card and a Shape. In order to subtract the value of the Shape from the number on the Card, children may mentally partition the Shape, say the number needed to be subtracted to reach 10, and then say the number to be subtracted from 10 to give the answer.

**Extension**  
Repeat the above activity using Numeral Cards showing higher numbers that end in 1, 2, 3, 4 or 5.

**Using and applying**  
Ask children word problems that use the bridging strategy.

**Key question for assessment**  
How can I split 6 to answer  $13 - 6 = \square$ ?

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**Key mathematical idea** Equivalence Kit 2 Using Pattern 4

**Recognising that symbols can stand for unknown numbers**


**Aim**  
→ To recognise the use of a symbol such as  $\square$  or  $\Delta$  to stand for an unknown number.

**Language**  
balances, the same amount, equal to, equals, missing number, unknown, position

**Activity 1**

**Step 1**  
Teacher puts a Numicon 10-shape in the right pan of a pair of Balancing Pans.


**Step 2**  
Teacher now puts a 4-shape in the left pan, explains to children that the pans need to be balanced and that this problem can be written in a special way. Teacher writes  $4 + \square = 10$ .



**Activity 2**

**Step 1**  
Teacher writes an equation with the empty box first, e.g.  $\square = 7 + 3$ .

**Step 2**  
• Teacher puts  $7 + 3$  in the right pan and asks children "What is needed to make the pans balance?"  
• When children have answered, teacher puts the 10-shape into the left pan and completes the equation by writing 10 in the empty box. Make sure children have noticed that the total is on the left before the equals sign.



**Step 3**  
Teacher asks children "What do we need to put with the 4 to make the pans balance?" When children have answered, put the 6-shape into the pan with the 4-shape and complete the equation by writing 6 in the empty box.

**Step 4**  
Repeat with other examples and with the empty box in different positions.

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## Kit 2, Numbers and the Number System 10

**Title:** Rounding to the nearest 10

**Key Mathematical Idea:** Rounding

**Activities 1 and 2:** (in brief) Making numbers with Numicon Shapes and rounding up or down to the nearest multiple of 10.

## Kit 2, Calculating 14

**Title:** Commutative property of multiplication, making arrays

**Key Mathematical Idea:** Multiplication, Commutativity

**Activity 2:** (in brief) Using the shapes and the Number line to show commutative facts.

## Kit 2, Calculating 17

**Title:** Introducing division "How many in....?"

**Key Mathematical Idea:** Division – quotation structure. Inverse

**Activity 2:** (in brief) Placing 10 shapes along the number line to find how many tens in a given multiple of ten.

**Key mathematical idea** Rounding Kit 2 Numbers and The Number System 10

**Rounding to the nearest 10**

**Aim**

- To round numbers to the nearest 10.
- To understand 'half way between'.
- To learn that 5 'rounds up'.

**Language**

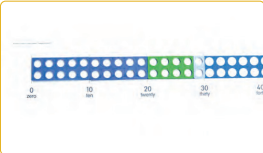
rounding, nearest, further away, next, lower, how many, multiple of 10, decade, between, half way between

**Activity 1**

**Step 1**  
Teacher makes a number, e.g. 28 using Numicon Shapes and asks which multiple of 10 comes before and after 28. Lay Shapes on Numicon Tens Number Line.

**Step 2**

- Teacher asks children whether the 28 is closer to 20 or 30.
- "How many away from the 30 is 28?"; "How many away from the 20 is 28?"
- "How can you prove which is closer?" (Use a 2-shape.)



**Step 3**  
Try the other numbers between 20 and 30 (except 25). Make a list showing whether they are closer to 20 or 30.

**Step 4**  
Look at the list, discuss it and introduce the word 'rounding'. (A useful mnemonic for rounding is 'we round to numbers that end in a nice round zero!')

**Step 5**  
Always avoiding numbers ending in 5, round other numbers within 100 initially within one other decade, then randomly. Always prove the answer on the Tens Number Line.

**Activity 2**

**Step 1**  
Teacher introduces '5' by saying "We are now going to learn about a very special number". Discuss with the children what they think should be done about rounding 25.

**Step 2**  
Look at a Number Line, find a number ending in 5 and ask children "How far is 5 from the previous multiple of 10" and "How far is it from the next multiple of 10?" Prove by using apparatus and by jotting on an empty number line that "5 is exactly half way between".

**Step 3**  
Try another decade to check that the same rule applies.

**Step 4**  
Conclude the discussion by explaining that 5 is a special number. It is exactly 'half way between' each multiple of 10 and it always 'rounds up'.

**Independent practice**

**Individual work or working in pairs**

- Children turn Cards from 0-100 Pack and round the numbers. Some children may still rely on laying the Numicon Shapes along the Numicon Tens Number Line.
- Using a 0-100 Number Line, children find the number that is half way between every decade. They then record these between each multiple of 10 on an empty number line.

**Key questions**

- Which numbers would you round up to the next multiple of 10?
- Which numbers would you round to the previous multiple of 10?

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**Key mathematical idea** Multiplication, Commutativity Kit 2 Calculating 14

**Commutative property of multiplication, making arrays**

**Aim**

→ To understand the commutative property of multiplication.

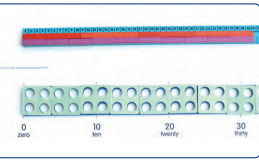
**Language**

times, multiply by, array, equal to, product, commutative fact

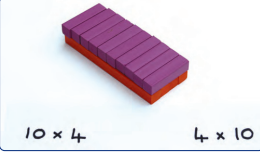
**Activity 1**

**Step 1**  
Teacher puts out four 10-shapes arranged vertically and asks children for the product. Now, with the children the teacher lays the four 10-shapes along the Numicon Tens Number Line to check.

**Step 2**  
Teacher asks "Four tens equal how many fours?" and places the ten 4-shapes on top of the four 10-shapes so the commutative property of multiplication can be seen.



**Step 3**  
Teacher places the ten 4-rods side by side on top of the four 10-rods so the commutative property may be seen as an array. Record these commutative facts.



$10 \times 4$        $4 \times 10$

**Independent practice**

**Game for 2 players**

- Have ready multiplication facts (photocopy masters 22-23), Numicon Shapes, Numicon Tens Number Line.
- Player 1 takes a multiplication, collects the corresponding Numicon Shapes and puts them along the Numicon Tens Number Line.
- Player 2 makes the corresponding commutative fact on top of the Shapes.
- Both players record both commutative facts and find the product.

**Game for 2 players**

Repeat the above game using Number Rods (along the Number Rod Track). Children then take the Rods out of the Track and arrange them in an array as shown in Activity 2 above.

**Individual work**

Children record arrays on squared paper, writing both facts. (It can be helpful to lay Rods on the squared paper first.)

**Key question**

If  $5 \times 6 = 30$ , do you know the product of  $6 \times 5$ ?

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**Key mathematical idea** Division – quotation structure, Inverse Kit 2 Calculating 17

**Introducing division "How many in ...?"**

**Aim**

→ To begin to understand division (quotation) as the inverse of multiplication.

**Language**

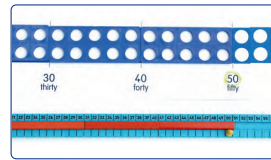
how many in, multiplication fact, inverse, connection, partner

**Activity 1**

**Step 1**  
Teacher chooses a number that is a product in the 10 times table e.g. 50 and highlights it on the Numicon Tens Number Line.

**Step 2**

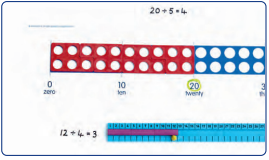
- Teacher asks children "How many 10's in 50?"
- Children can check by placing five 10-shapes along the Number Line.



**Step 3**  
Teacher continues to choose different products of the 10 x table, highlights them and asks the question, "How many 10's in ...?" Continue to check each time placing 10-shapes on the Number Line.

**Step 4**

- Once children are used to the game, explain that the arithmetic they are doing is called division. By now the children are used to symbols so introduce the ÷ sign (ask the children for their ideas of a suitable action) and show them how to write  $50 \div 10$  to be read as "How many 10's in 50?"
- Repeat with Number Rods in the Number Rod Track.



$20 \div 5 = 4$

$12 \div 4 = 3$

**Step 5**  
Repeat Steps 1-4 using products of other multiplication tables that the children know.

**Independent practice of Activity 1**

**Individual work or working in pairs**

- Have ready divisions on Cards (photocopy masters 25-26), Numicon Shapes and Tens Number Line or Number Rods and Rod Track.
- Children take a division, highlight the number to be divided on the Number Line or Rod Track and find 'how many in' using Shapes or Rods. Record the answer.

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