



- Recall and use addition and subtraction facts up to 20 fluently, and derive and use related facts up to 100.
- Add and subtract with concrete objects, representations and mentally
 $TO + 0 =$ $TO + \text{tens} =$ $TO + TO =$ $0 + 0 + 0 =$
- Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- Recognise and use the inverse relationship between addition and use this to check calculations and solve missing number problems.

Teachers and/or pupils may demonstrate these strategies on a numbered number line supported by a variety of materials.

Addition

Reordering Children should understand why it is more efficient to reorder numbers when adding. $14 + 27$ becomes $27 + 14$

Bridging They should then use knowledge of number bonds with bridging. $27 + 14 = 27 + 3 + 11$ $3 + 8 + 7$ becomes to $3 + 7 + 8$ (using knowledge of number bonds to 10)

Partition both numbers then add and recombine

$$42 + 36 = 40 + 30 + 2 + 6 = 70 + 8 = 78$$

Partition just one number

$$55 + 42 =$$

$$55 + 40 = 95 + 2$$

Doubles and near doubles

$$15 + 16 \text{ becomes double } 15 + 1$$

Compensating ~ adding a close multiple of 10 (e.g. 18, 19, 21, 22)

$$23 + 19 \text{ becomes } 23 + 20 - 1 = 42$$

Deriving new facts

$$3 + 7 = 10 \text{ therefore}$$

$$30 + 70 = 100 \quad 100 - 30 = 70 \quad 30 = 100 - 70 \quad 70 = 100 - \square$$

Subtraction

Bridging through ten and multiples of ten should also be used when subtracting.

$$\begin{aligned} 73 - 16 \text{ becomes } 73 - 10 - 3 - 3 \\ = 63 - 3 - 3 \\ = 57 \end{aligned}$$

Counting on in tens and ones to find the difference.

$$\begin{aligned} \text{Count on because the numbers are close together} \sim 23 - 17 = 6 \\ 17 + 3 = 20 \\ 20 + 3 = 23 \end{aligned}$$

Count back if numbers are further apart ~ $45 - 22 = 23$ $45 - 20 - 2 = 23$

Compensating ~ subtracting a close multiple of 10 (e.g. 18, 19, 21, 22)

$$65 - 18 \text{ becomes } 65 - 20 + 2 = 47$$



Addition - $20 + 0 =$ $20 + \text{tens} =$ $20 + 20 =$ $0 + 0 + 0 =$

When teaching the stages in progression start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?'

MANUPLATIVES AND REPRESENTATIONS

$27 + 14 = 41$

Exchange 10 ones for 1 ten

$27 + 14 = 41$

$7 + 4 = 11$

$27 + 14 = 41$

$27 + 3 + 10 + 1$ Bridge to multiple of 10 then add

Other Representations

Bead String ITP

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

Hundred square

NUMBERED NUMBER LINES (LEADING TO ENL)

Adding tens then ones Using knowledge of bonds to ten

JOTTINGS

$$\begin{aligned} 27 + 14 &= 27 + 10 + 4 \\ &= 37 + 4 \\ &= 41 \end{aligned}$$

$$\begin{aligned} 27 + 14 &= 20 + 10 + 7 + 4 \\ &= 30 + 11 \\ &= 41 \end{aligned}$$

$$\begin{aligned} 27 + 19 &= 27 + 20 - 1 \\ &= 47 - 1 \\ &= 46 \end{aligned}$$

Begin to record addition in columns to support place value and prepare for formal written.

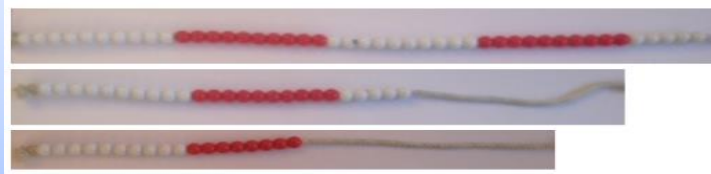
$30 + 4$	$30 + 4$
$20 + 5$	$20 + 5$
$50 + 9$	$50 + 9$



Subtraction - TO - 0 = TO - Tens = TO - TO

When teaching the stages in progression start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?'

MODELS



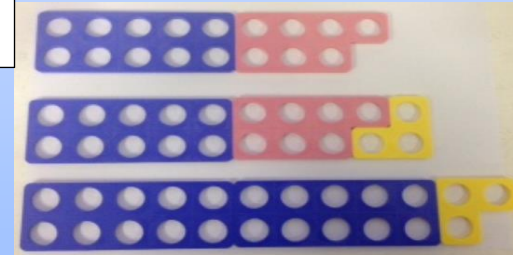
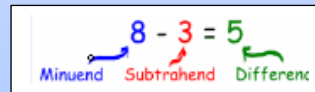
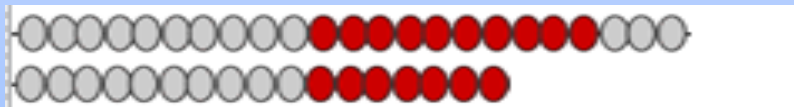
$$45 - 27 = 45 - 20 - 7$$

$$= 25 - 7$$

$$= 18$$

Beadstring - subtract tens then ones.

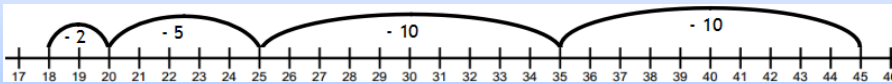
Minuend and subtrahend close together $23 - 17 = 6$



Numicon - Bridge to nearest 10 and add remainder.

Beadstring can make it easier to see it is more efficient to count on when difference is small. Bridge to nearest 10 and add remainder.

Minuend and subtrahend far apart count back



Smaller jumps leading to more efficient jumps.

$$45 - 27 = 45 - 20 - 7$$

$$= 25 - 7$$

$$= 18$$

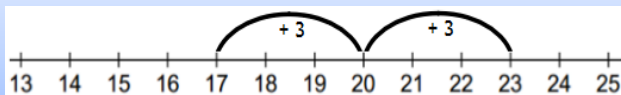
$$73 - 16 = 73 - 10 - 6$$

$$= 63 - 3 - 3$$

$$= 60 - 3$$

$$= 57$$

Minuend and subtrahend close together



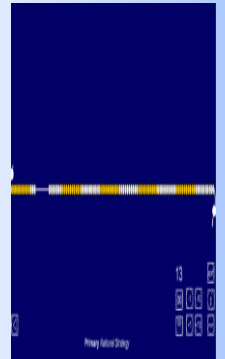
$$23 - 17 = 6$$

$$65 - 18 = 65 - 20 + 2$$

$$= 45 + 2$$

$$= 47$$

Other representations



Bead String ITP

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

Hundred



Difference

NUMBERED LINES (LEADING TO ENL then Jottings)

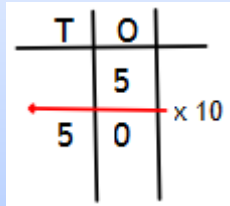


Multiplication and Division

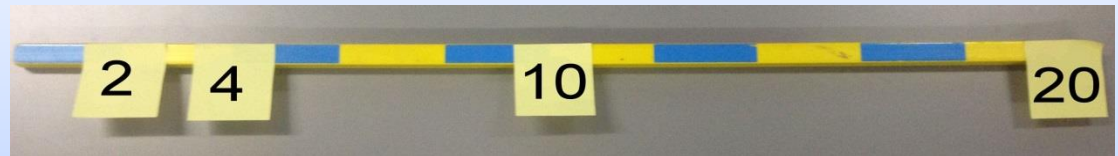
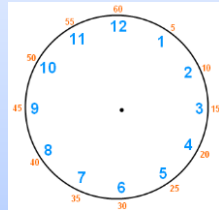
- Recall and use multiplication and division facts for 2, 5 and 10 multiplication tables.
- Know doubles of numbers to at least 15, doubles of multiples of 5 up to 50
- Recognise odd and even numbers
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using \times , \div and $=$
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Teachers and/or pupils may demonstrate these strategies on an empty number line (ENL) supported by a variety of materials.

Connect $\times 10$ table to place value.



Connect $\times 5$ table to divisions on the clock face



Counting stick to learn tables. Using known facts to work out unknown.



DEVELOPING MENTAL FLUENCY STRATEGIES

Partition, double ones, double tens and recombine

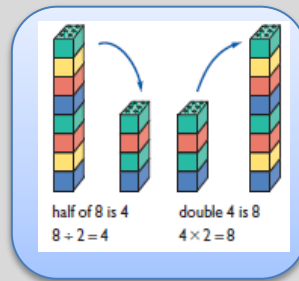
$16 \times 2 =$

$16 \times 2 = 20 + 12 = 32$

$10 \times 2 = 20$

$6 \times 2 = 12$

Use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by 2

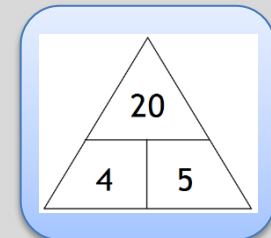


Children begin to relate divisions to fractions and measures
 $40 \div 2 = 20$, half of 40 is 20, 20 is half of 40

Children use commutativity and inverse relations to develop multiplicative reasoning

$4 \times 5 = 20$

$20 \div 5 = 4$ and $20 \div 4 = 5$





Multiplication - Within 2, x5 and x10 multiplication tables including missing numbers such as $2 \times ? = 16$

When teaching the stages in progression start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?'

MODELS

Arrays

$4 \times 2 = 8$ $2 \times 4 = 8$

Consider turning the array (rather than making two) in order for children to see the equivalence between the two calculations.

2 4 6 8 10

Counting on fingers

$5 + 5 + 5 + 5 + 5 + 5 = 30$
 $5 \times 6 = 30$
 5 multiplied by 6
 6 groups of 5
 6 hops of 5

$10p + 10p + 10p + 10p + 10p = 50p$
 $10p \times 5 = 50p$
 5 hops of 10

Multiplication facts ITP

$5 \times 4 = 4 \text{ groups of } 5$

NUMBERED NUMBER LINES (LEADING TO ENL)

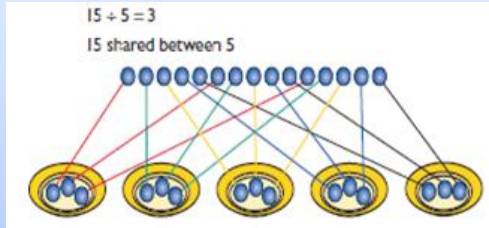
$4 \times 2 = 8$ Repeated addition \longrightarrow

0 1 2 3 4 5 6 7 8 9 10 11 12

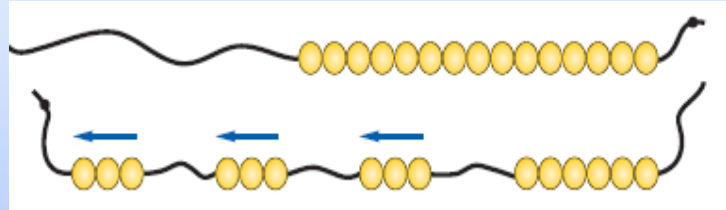


When teaching the stages in progression, start with models and make connections with the number line. Place emphasis on the ability to explain and reason about the mathematics behind the method. E.g. Ask 'What's the same and what's different about these three approaches to the same calculation?'

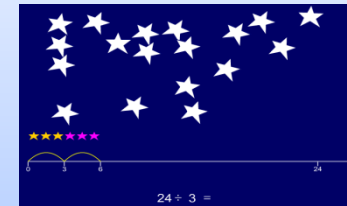
Sharing



Grouping

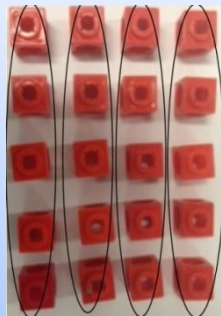


Grouping ITP



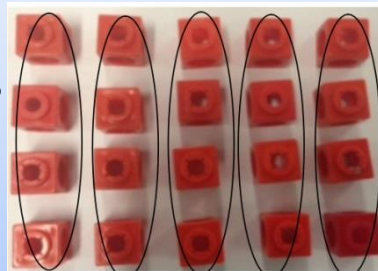
At this stage children still need experience of both grouping and sharing. Grouping will become the basis of short and long division. As they become more confident with their multiplication tables, children should be able to identify ten and then five groups of some

MODELS



$$20 \div 5 = 4$$

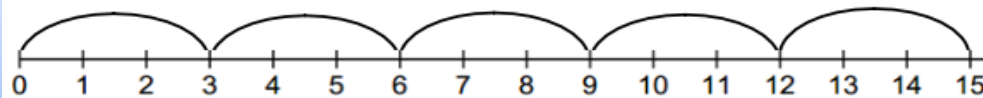
Arrays



$$20 \div 4 = 5$$

Arrays- In order for children to understand the relationship between multiplication and division, arrays can be used to show grouping.

$15 \div 3 =$ Repeated subtraction on a numbered number line.



Some children may find it easier to experience this as counting forwards in groups of the divisor.