Calculation policy

The calculation policy offers guidance for developing an understanding of the four operations of addition, subtraction, multiplication and division with children across the school.

Aims of the calculation policy

- To promote consistency in calculation across the school.
- To offer a 'core' or 'default' set of methods that every child become competent at using and will be built upon year on year. Once children acquire mastery of these then other calculation strategies can be introduced, if appropriate.
- To strengthen continuity and progression for children as they develop their understanding of written calculation for the four operations.
- To provide a whole school document for consistency in calculation for teachers, supply teachers, teachers new to the school and Teaching Assistants.

Models and images

- The development of methods needs to be supported by appropriate apparatus such as bead strings, place value charts and cards, multilink, Numicon and Cuisenaire.
- There also needs to be a strong and clear use of models and images such as the blank numberline for addition and subtraction and the array for multiplication and division.
- Suggestions of different models and images are included for each number operation.

Good practice in written calculation

- Establish mental methods based on good understanding of place value combined with competent and secure recall of number bonds to and within twenty and times tables facts.
- Always encourage children to look out for special cases that can still be done mentally even when moving onto written methods.
- Ensure that mental estimates are carried out before written methods are used, especially as the numbers get larger.
- Ensure that the understanding of remainders and what to do with them in context is taught alongside division throughout.
- Once written methods are introduced, keep mental skills sharp by continuing to develop and apply them to appropriate examples.
- Develop a robust series of checking strategies with children such as inverse operation, so that they can check their calculations for accuracy independently and regularly.

Concepts for	Aggregation: two quantities are combined into a single quantity and addition is used to determine the total, e.g. Jane has 6 apples and Paul				
addition	has 3 apples. How many do they have altogether?				
	Augmentation: A quantity is increased by a certain amount and addition is used to determine the result of the increase, e.g. I have 6 apples				
	and I am given 3 more. How many altogether?				
	Phase 1	Phase 2	Phase 3		
Addition fluency at the end of phase and APP opportunities Written form	Understand addition as finding the total of two or more sets of objects Add numbers of objects to 10 Represent their work with objects and pictures Begin to represent their work using symbols and simple diagrams Count sets of numbers reliably Combining	Jump on in jumps more than 1 using number bonds to 10 Count on to landmark 10s on the number line Use mental recall of addition facts to 10 Begin to understand the place value of each digit; to 100 Choose the appropriate operation when solving addition problems Number line 9 + 5 = counting on to the landmark 10	Use of a number line to calculate TU + TU jumping on to landmark 10s Use of a number line to calculate TU + TU counting on in jumps of 10 Add two digit numbers Begin to understand the place value of each digit; to 100 Use mental recall of addition facts to 20 in solving problems involving larger numbers Jumping on to landmark 10: 36 + 16 =		
	Number line – counting on in ones $ \begin{array}{c} +i + i + i + i + i + i + i + i + i + i $	q + 5 = $+1$ $+1$ $+1$ q 10 11 12 13 14 $(Lardmack)$ 10 Moving along the number line in jumps of more than 1 is an important stage here. $22 + 6$ $+5$ $+1$ $22 + 6$ $+5$ $+1$ $22 + 6$	Answer = 52 40 40 50 52 40 50 52 40 40 50 52 40 10 Counting on in jumps of 10: 36 + 16 = 40 50 52 40 40 50 52		
Models and	Bead strings: 0-20 in groups of 5 and 0	0-100 in groups of 10 Nu	micon		
images to	Multilink	Die	nnes/Sweety jar		
support	Number lines				
addition	Counting stick				

Addition calculation progression.

Addition calculation progression.

	Phase 4	Phase 5	Phase 6
Addition	Understanding of place value –	Write 'like' place values under one another in	Begin addition calculation by adding the units
fluency at the	partitioning a number	columns	first
end of phase	Informal addition using partitioning	Add two- and three- digit numbers using a	Add three-digit numbers using a written
and APP	internal addition using partitioning	written method	inculou
opportunities	Add two- and three- digit numbers		Use efficient written methods of addition
	using a written method	Use mental recall of addition facts to 20 in	
		solving problems involving larger numbers	
	Use mental recall of addition facts to 20	To understand place value in numbers to 1000	
	numbers	To understand place value in numbers to 1000	
Written form		Formal version of phase 4.	Expanded compact method:
	94 + 68	Expanded column method:	Adding larger numbers first:
			4.38
	90 + 60 4 + 8	734 + 457 =	+216
	$150 \pm 12 - 162$	734 - 700 + 30 + 4	600 (400+200)
	150 + 12 - 102	/34 - /00 - 30 - 4	40 (30 + 10)
		<u>457 = 400 + 50 + 7</u>	+ 14 (8+6)
			654
		1300 + 80 + 11 = 1391	
			Adding units first:
			438
	Use Diennes to model partitioning and		+ 216
	combining		14 (6+8)
			40 (30+10)
			+ 600 (400 + 200)
			654
Models and	Bead strings: 0-20 in groups of 5 and (1 -100 in groups of 10 Num	nicon
images to	Multilink	Dier	ines/Sweety jar
support	Number lines		
addition	Counting stick		

	Phase 7	Phase 8
Addition fluency at	Use knowledge of place value to represent and calculate addition problems using the compact method	Understand the place value involved with decimal numbers
the end of	Use efficient written methods of addition	Understand the role of the decimal point
APP		Use known facts, place value, knowledge of operations to calculate with decimals to two places
opportunities		
		Show understanding of situations by describing them mathematically using symbols, words and diagrams
Written form	Compact method: $ \begin{array}{r} 438 \\ +216 \\ \underline{654} \\ 1 \end{array} $	Adding decimals using the compact method:
	"I start by adding together the numbers in the column of smallest place value: 8 plus 6 is 14. I write the 4 (from the 14) in the units column and carry the 10 over to the tens column, recording it as 1 ten below the space for my answer. I then add 30, 10 and the carried 10 together to make 50 and record this as 5 tens in the tens column. I now add 400 and 200 together totalling 600 and record this as 6 hundreds in the hundreds column. My answer is 654."	"I start by adding together the numbers in the column of lowest place value: 0.02 plus 0.09 equals 0.11; I record a 1 in the hundredths column to represent the 1 hundredth in 0.11 and carry the 0.1 (from 0.11) over to the tenths column and record it as 1 tenth underneath my answer space. I then add together 0.1, 0.7 and my carried 0.1 to give me 1.9. I write 9 in the tenths column to represent the 9 tenths in 1.9 and carry the 1 over to the units column to represent the 1 unit in 1.9. I now add together 5, 1 and the carried 1 totalling 7 and record this in the units column. My next step is to add together the 80 and 60 giving me 140; I record this as 4 tens in the tens column and 1 hundred in the hundred column. My answer is 147.91."
Models and images to support addition	Bead strings: 0-20 in groups of 5 and 0-100 in groups of 100 Multilink Number lines Counting stick	Numicon Diennes/Sweety jar

Addition calculation progression.

Concepts for	Take away: 'taking away' objects from a set and finding how many are left			
subtraction	Difference: finding the difference between two quantities, e.g. What is the difference between and? How many more? How many			
	less (or fewer)? How much greater? How much smaller?			
	Phase 1	Phase 2	Phase 3	
Subtraction	Understand subtraction as 'taking	Understand that 'counting on' on the	Use of a number line to count on when	
fluency at the	away' objects from a set and finding	number line is the same as subtraction	finding the difference (TU – TU/HTU -	
end of phase	how many are left	using the difference methods	TU) jumping on to landmark 10s	
	Subtract numbers of objects to 10	Use mental recall of subtraction facts to	Subtract two digit numbers	
opportunities	,	10	C C	
	Represent their work with objects		Begin to understand the place value of	
	and nictures	Begin to understand the place value of	each digit: to 100	
		each digit: to 100		
	Pagin to represent their work using		Lise mental recall of subtraction facts to	
	symbols and simple diagrams		20 in solving problems involving larger	
	symbols and simple diagrams		20 III solving problems involving larger	
			numbers	
	Solve subtraction problems involving			
	up to 10 objects			
Written form	Take away counters etc	Beadstring 'seeing difference'	Builds on the difference model	
	6 - 2 = 4			
		1	Number line – counting on	
	E (0. ·)		56-32	
		i	+6 +10 +6	
	↓ ↓	and the second		
			32 40 50 56	
	Take away on number line	↓		
		Counting on number line		
		+2		
	/1 5 /	\bigcirc		
	+ 6	(+1 +1)		
		567		
Models and	Bead strings: 0-20 in groups of 5 and 0-	100 in groups of 10		
images to	Multilink Numicon			
support	Number lines Diennes/Sweetv	jar		
subtraction	Counting stick			

Subtraction calculation progression.

Subtraction calculation progression.

	Phase 4	Phase 5	Phase 6
Subtraction fluency at the end of phase and APP opportunities	Understanding of place value – 'what makes up a number' Subtract two- and three- digit numbers using a written method Use mental recall of subtraction facts to 20 in solving problems involving larger numbers	Write 'like' place values under one another in columns, e.g. hundreds under the hundreds column Begin subtraction calculation by subtracting the units first Subtract two- and three- digit numbers using a written method Use mental recall of subtraction facts to 20 in solving problems involving larger numbers To understand place value in numbers to 1000	Use knowledge of place value to represent and calculate subtract problems using the compact method Record the exchanging Use efficient written methods of subtraction
Written form	Builds on the take away model 74 - 53 70 - 50 - 4 - 3 20 + 1 = 21 74 - 27 70 - 20 - 7 Key point: 70 - 10 - 14 - 7 60 + 7 = 67 "When using this method, the children need to first partition the 74 into 70 and 4 and the 27 into 20 and 7. They then need to understand that taking 7 away from 4 will not give a positive number and so they need to partition the 20 into two tens to allow you to take 7 away from 14. They must also understand that they are now taking 10 away from 70 instead of 20." Use Diennes to model the 'exchange'	Extended column method: 356 $300 + 50 + 6 = 1 \cdot 1 \cdot 1179$ $100 + 70 + 91 \cdot 1 \cdot 1200 + 140 + 16-100 + 70 + 7 = 177"When using this method, the childrenneed to understand that, for example,taking 70 away from 50 will not give youa positive number and so they need topartition the numbers into moreappropriate chunks. In the exampleabove, 356 has been split into 200, 140and 16, making the subtraction possible."$	Compact method: 256 – 79= <i>Starting in the column with the lowest place</i> <i>value, here the units, we are unable to take 9</i> <i>away from the 6 and get a positive number,</i> <i>so we exchange the 50 for 40 which provides</i> 10 ones, making the 6 now 16. 16 take away <i>9 is 7 and this is recorded in the units column.</i> <i>We now have 40 take away 70, which again</i> <i>is not possible using this method, so we</i> <i>exchange the 200 for 100 and 10 tens to</i> <i>make the 40 now 140. 140 take away 70 is</i> <i>70, so we record the 7 tens in the tens</i> <i>column. We then move to the hundreds</i> <i>column, we now have 1 hundred take away 0</i> <i>which gives us 100, which we record as 1 in</i> <i>the hundreds column. Our answer is 177."</i>
Models and images to support	Bead strings: 0-20 in groups of 5 and 0-100MultilinkNumicon	in groups of 10 Diennes/Sweety Jar	
subtraction	Number lines Counting stick		

Subtraction calculation progression.

	Phase 7		
Subtraction	Understand the place value involved with decimal numbers		
fluency at	Franka and all all and and and		
the end of	Exchange all place values,		
phase and	E.g. tenths, hundreaths as well as tens, hundreas and units		
APP	Use efficient written methods of subtraction		
opportunities			
Written form	Subtracting decimals using the compact method:		
	25.27 – 7.52 =		
	- <u>7.52</u> - <u>7.52</u> 17.75		
	"Starting with the lowest place value, here the hundredths		
column, 0.07 take away 0.02 is 0.05; we record the 5			
	hundredths as 5 in the hundredths column. We then move the tenths column, we are unable to take 0.5 away from (
	aet a positive number, so exchange the 5 for 4 and 10 ten		
	added to the 0.2, gives 1.2. Now we take 0.5 away from 1.2		
	which gives us 0.7; we record the 7 tenths in the tenths column.		
	Due to the one we exchanged before, we now have 4 units take		
	away 7 units which will not give us a positive number, so we		
	exchange the 2 tens 1 ten and 10 ones. Added to the 4 units,		
	we now have 14 take away 7 which gives us 7; we record this		
	as 7 units in the units column. Due to the exchanged ten, we		
	now have 10 subtract 0 giving us 1 ten which is recorded in the		
	tens column. Our answer is 17.75."		
Models and	Bead strings: 0-20 in groups of 5 and 0-100 in groups of 100		
images to	Diennes/ Sweety jar		
support	Multilink Numicon		
subtraction	Number lines		
	Counting Stick		

Concepts for division	Sharing model: Sharing a set of objects between a certain number Grouping model: Sorting objects/numbers into a certain number of groups.		
	Fraction model: Finding half of a number	Dhase 2	Dhase 2
Division fluency at the end of phase and APP opportunities	Language: Sharing – divided between Grouping – divided by Fraction – divided into Begin to use the fraction one half	Use arrays to picture division facts from multiplication facts, including repeated addition and subtraction Begin to use halves and quarters and relate the concept of half of a small quantity to the concept of half of a shape Understand that halving is a way of 'undoing' doubling	Number lines (repeated addition and subtraction) to solve division problems put into context (see below) Finding division from multiplication facts Remainders in context Derive associated division facts from known multiplication facts Solve whole number problems including those involving division that may give rise to remainders
Written form	6÷3=2	Linking division with the array 12 ÷ 3 = 4 12 ÷ 4 = 3	Number lines; division problems in context: Repeated subtraction: I eat 3 sweets each day. I have 36 sweets in my bag, how many days will my sweets last? -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -3 -
	$\sum_{i=1}^{n}$	Repeated subtraction on a number line:	Repeated addition:
	ا به من		Tam saving for a CD which costs £36. I get £3 pocket money each week, how many weeks will it take me to save enough money to buy the CD? 12 guilts q £3. Answer: 12 \cdot
		Trios: 10 $\div \qquad \div \qquad \div \qquad 2 \qquad x \qquad 5$	Remainders: rounding up and down A class of 36 children are going on a picnic and have ordered picnic baskets for their outing. Each picnic basket serves 5 children. How many picnic baskets will they need to feed all the children? $36 \div 5 = 7 r.1 \text{ so } 8$ baskets are needed. Markets: 1 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 +
Models and images to support division	Array Objects/counters/multilink	Counting stick Bead strings: 0-20 in groups of 5 a Trio	$ \begin{array}{c c} $
	ITP grouping	Diennes/Sweety jar	

	Number line – scaling Multiplication cards which show the multiples which make up given numbers and their multiplication fact			
	Phase 4	Phase 5	Phase 6	
Division fluency at the end of phase and APP opportunities	Working out division calculations which are out to the known times tables Recall multiplication facts up to 10 x 10 and quickly derive corresponding division facts Divide two-digit numbers by 2, 5, 4 or 5 as well as 10 with whole number answers Solve whole number problems including those involving division that may give rise to remainders	Children will need to been confident with phase 5 of multiplication Using known multiplication and division facts to find the missing numbers in the grid Remainders expressed as r.1, r.½ or r.0. Divide whole numbers by 10, 100 and 1000 Move the partitioning model into the more formal grid method for recording division calculations Recall multiplication facts up to 10 x 10 and quickly derive corresponding division facts Use efficient written methods of short division Use understanding of place value to divide whole numbers by 10, 100 and 1000	Children will need to be confident with phase 6 of subtraction Understanding that the numbers need to organized to be set out in columns according to their place value Recall multiplication facts up to 10 x 10 and quickly derive corresponding division facts Use efficient written methods of short division Use understanding of place value to multiply whole numbers by 10, 100 and 1000 Understand and use an appropriate non-calculator method for solving problems that involve dividing any three digit number by any two digit number	
Written form	Chunking in multiples of: $85 \div 5 =$ $50 \qquad 35$ $\downarrow \div 5 \qquad \downarrow \div 5$ $10 \qquad + \qquad 7 = 17$ Using known number facts.	Choosing the chunks: $475 \div 6 =$ $420 + 54 + r.1$ $420 + 54 + r.1$ $420 + 9 = 79 r.1$ "I want to make the division into more manageable chunks - what multiplication fact do I know that could help me? I know that 6 multiplied by 70 equals 420, so that's one manageable chunk. That leaves me with 55 - I know that 6 multiplied by 9 is 54: another manageable chunk. That then leaves me with a remainder of 1." Grid method – more compact way of setting out the above method: (Using known multiplication and division facts to find the missing numbers in the grid) $\frac{1}{6}$ 420 54 $r.1$	Chunking: (Chunks that are easy to subtract) 475 ÷ 6 = 6)475 420 (6× 70) -55 -54 (6× 9) -54 (6× 9) Answer=79r.1. 975 ÷ 7 = 7)975 -700 (7×100) -140 (7× 20) $^{\circ}x^{1}35$ (7× 10) $-\frac{70}{65}$ (7× 5) $-\frac{35}{23^{10}}$ (7× 4) -28 (7× 4) -28 (7× 4) -28 (7× 4)	

Models and	Array Co	ounting stick	Bead strings: 0-20 in groups of 5 and 0-100 in groups of 10	
images to support	Objects/counters/multilink Tr	rio		
division	ITP grouping D	iennes/Sweety ja	r	
	Number line – scaling N	Aultiplication car	ds which show the multiples which make up given numbers and their multip	plication fact
	Phase 7		Phase 8	
Division	Seeing each digit in the dividend as separate r	numbers	Use compact method to solve division calculations involving	
fluency at			decimals, in the context of: kg, l, km, money	
, the end of	Using known multiplication facts to help			
phase and	Depending the enquerite each concrete calcul	ation	Understand the place value involved with decimal numbers	
	Recording the answer to each separate calcul	ation uickly dorivo	Understand the role of the desimal point	
	Recall multiplication facts up to 10 x 10 and q	ulckly derive	Becall multiplication facts up to 10 x 10 and quickly derive	
opportunities			corresponding division facts	
	Use efficient written methods of short divisio	n	Use efficient written methods of short division	
	Ose endent written methods of short divisio		ose endent written methods of short division	
	Use understanding of place value to multiply	whole	Use understanding of place value to multiply whole numbers by	
	numbers by 10, 100 and 1000		10. 100 and 1000	
	Understand and use an appropriate non-calcu	ulator	Understand and use an appropriate non-calculator method for	
	method for solving problems that involve div	iding any	solving problems that involve dividing any three digit number by	
	three digit number by any two digit number		any two digit number	
Written form	Compact method:		Focus on understanding by returning to informal partitioning:	
	(Biggest chunks)			
	975 ÷ 12 =		3.6 ÷ 0.6 =	
	240 (12 × 20) 12)	81 r.3	3 0.6	
	17/35	96		
	$-240(12 \times 20)$	15	÷ 0.6 ÷ 0.6	
	- 240 (12 × 20)	3		
	- 240 (12 × 20)	2 Contraction	* *	
	0 5 $12 (12 \times 1)$		5 + 1 = 6	
	3			
	Answer = 81 r 3			
Models and	Array Co	ounting stick	Bead strings: 0-20 in groups of 5 and 0-100 in groups of 10	
images to support	Objects/counters/multilink	rio	-	
aivision	Number line – scaling	iennes/Sweety ja	r de which chow the multiples which make up given numbers and their	
	multiplication fact		us which show the multiples which make up given numbers and their	
L	manapheution nucl			_

Multiplication calculation progression.

The model that supports multiplication is the array.

Concepts	Repeated augmentation: multiplication means 'so many sets of' or 'so many lots of'.			
for addition	This policy is based on repeated addition and the array.			
	Phase 1	Phase 2	Phase 3	Phase 4
Multipli	Doubling – a number plus itself	Making the link that $3 + 3 + 3$	Using known multiplication	Using known multiplication
cation	or two lots of the same number	+ 3 is the same as 4 lots of 3,	facts/arrays to help solve	racts/arrays to help solve
fluency		which is the same as 4 x 3		unknown calculations
at the		Record their work in writing	Solve whole number	Solve whole number problems
end of			problems including those	including those involving
phase			involving multiplication	multiplication
and APP			5 1	
opportu			Recall multiplication facts up	Multiply two-digit numbers by
nities			to 10 x 10	2, 5, 4 or 5 as well as 10 with
				whole number answers
				Recall multiplication facts up to
				10 X 10
Written		Arrays	Using known facts to find other	Using partitioning modeling with
form	Double 3		number facts:	the array:
	- M a	and a start as		
	XX XX	3 x 4	8 x 4 = 2 x (8 x 2)	12 ¥ 3
	AL AL	4x3		
	A	3+3+3+3 4+4+4	× 8	× 10 2
			× × × × × × × ×	× × × × × × × × × × × × × × × × × × ×
		Connecting the array to the	2 × × × × × × × × ×	3 *************************************
	OR	number line:	7 *******	
	ාතය සතිය සතිය යනය පතිය			
	*** +***	the s 3 guings of 4	16 + 16 = 32	(Numbers bigger than the
		0 3 6 4 9 4		multiplication tables)
		12 4 junips \$3		
Models	Multilink Bead str	rings: 0-20 in groups of 5 and 0-10 $\overline{0}$ in gro	oups of 10	
to support	Counters/multilink			
multiplicati	ITP Multiplication array			
on				

Multiplication calculation progression.

	Phase 5	Phase 6	Phase 7	Phase 8
Multipli cation fluency at the end of phase and APP opportu nities	Use arrays to solve multiplication calculations outside known times tables facts up to 12 x 12 Multiply two-digit numbers by 2, 5, 4 or 5 as well as 10 with whole number answers Recall multiplication facts up to 10 x 10	Use a blank array to solve multiplication calculations outside known times tables facts up to 12 x 12 Multiply two-digit numbers by 2, 5, 4 or 5 as well as 10 with whole number answers Recall multiplication facts up to 10 x 10	Transfer the blank array into the more formal grid method for TU x TU and beyond Add answers vertically as in column method for addition Multiply whole numbers by 10 and 100 Use efficient written methods of short multiplication To use place value to multiply whole numbers by 10 or 100	Children will need to be confident with phase 6 of addition Transfer answers from grid method into expanded column method Write 'like' place values under one another in columns Multiply whole numbers by 1000 Use efficient written methods of short multiplication To use place value to multiply whole numbers by 10 or 100 Use understanding of place value to multiply whole numbers by 10, 100 and 1000 Understand and use an appropriate non- calculator method for solving problems that involve multiplying any three digit number by any two digit number
Written form	Partitioning of array: 14 x 8 = $ \begin{array}{c} 14 x 8 = \\ x + x + x + x + x + x + x + x + x + x +$	Blank array: $28 \times 11 =$ 20 810 200 807 140 56340 $+136$ $= 476$	Grid method: $72 \times 39 =$ $72 \times 39 =$ $\frac{\times 70 2}{30 2100 60}$ 9 630 18 2730 + 79 = 2808	Expanded column method: $72 \times 39 =$ 72 $\times 39$ 18 (9 × 2) 630 (9 × 70) 60 (30 × 2) 2100 (30 × 70) 2808
Models and images to support multiplica tion	Multilink Bear Arrays Counters/multilink ITP Multiplication array	d strings: 0-20 in groups of 5 and 0-1	00 in groups of 10	

The model that supports multiplication is the array.

Multiplication calculation progression.

The model that supports multiplication is the array.

	Phase 9	Phase 10
Multiplication fluency at the end of phase	Combine steps in the expanded method, E.g. all the answers to similar place value calculations (e.g. multiples of 10) are placed on the same line	Understand the place value involved with multiplying decimal numbers Understand the role of the decimal point
and APP opportunities	 Begin multiplication calculation by multiplying the units first Use efficient written methods of short multiplication To use place value to multiply whole numbers by 10 or 100 Use understanding of place value to multiply whole numbers by 10, 100 and 1000 Understand and use an appropriate non-calculator method for solving problems that involve multiplying any three digit number by any two digit number 	Use efficient written methods of short multiplication Use understanding of place value to multiply whole numbers and decimals by 10, 100 and 1000 Understand and use an appropriate non-calculator method for solving problems that involve multiplying any three digit number by any two digit number
Written form	Compact method: $72 \times 39 =$ $72 \times 39 =$ $72 \times 39 =$ $72 \times 39 =$ $72 \times 39 =$ $(9 \times 2) \times 20$ $21 60 \times 2 \times 20$ 30×20 30×70 1	To multiply a simple decimal by a whole number Multiplying decimals 7.5 \times 2.3 = $7.5 \times 2.3 =$ $7.5 \times 2.3 =$ $17.5 \times 2.3 =$ $17.5 \times 2.3 =$ 14×10.5 16.1 + 1.15 = 17.25
Models and images to support multiplication	MultilinkBead strings: 0-20 in groups of 5 and 0-1ArraysCounters/multilinkITP Multiplication array	LOO in groups of 10