Grange Primary School

Calculation Policy

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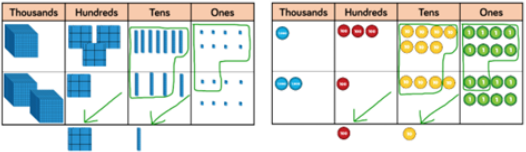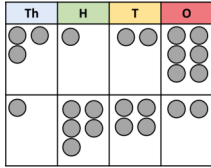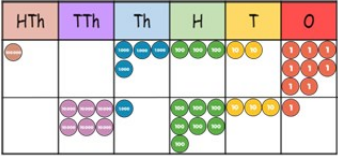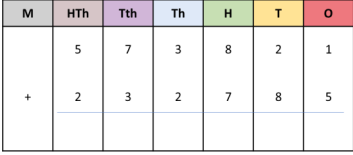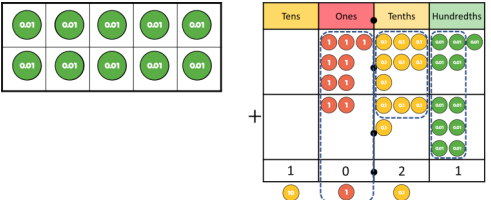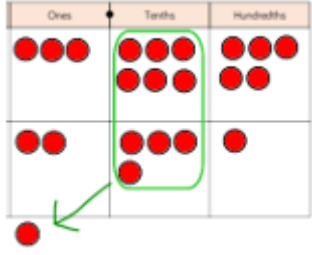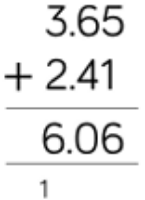
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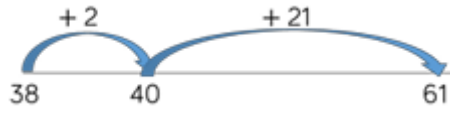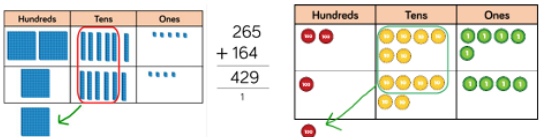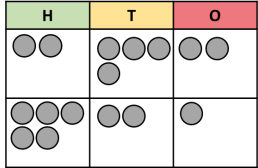| Skill Year Group	Concrete	Pictorial	Abstract
Adding 1-digit numbers within 10 Year 1	Use people or objects to show combining two separate 1-digit numbers into a new total.	Move to part-whole models or tens frames using the same representative as the concrete lesson. Children to move onto drawing to represent the calculation. Use of number tracks for counting on.	Progress to using numerals in the part whole models and transforming the tens frames into bar models. End result will be writing a number sentence. $4 + 3 = 7$
Adding 1 and 2-digit numbers to 20 Year 1 / Year 2	When adding digits that cross 10, it is important children understand the importance of ten ones equalling one ten.	Move to using familiar models such as part-whole models and number tracks. Year 2 may progress to number lines (alongside the concrete resources) to support the children in understanding how to partition their jumps. $8 + 7 = 15$ $+2 \quad +5$	Progress to using numerals in the part whole models and transforming the tens frames into bar models. End result will be writing a number sentence. $8 + 7 = 15$
Adding three 1-digit numbers Year 2	Children should be encouraged to look for number bonds to 10 (with manipulatives highlighting this) or doubles .This develops understanding of commutativity.	Progress to familiar models such as part-whole models. Number lines could be used to help reinforce the bonds to 10.	Progress to using numerals in the part whole models and transforming the tens frames into bar models. End result will be writing a number sentence. $7 + 6 + 3 = 16$

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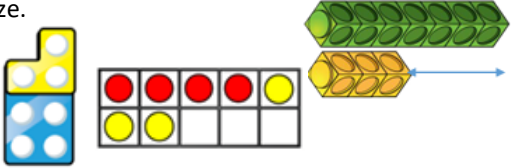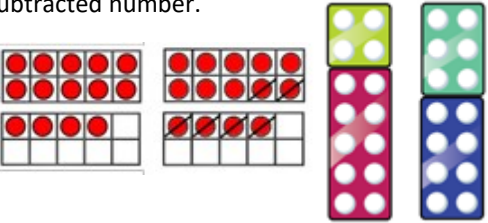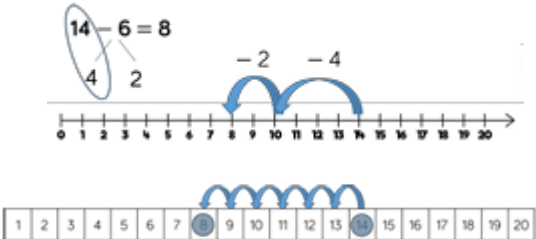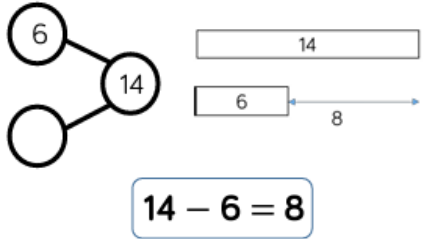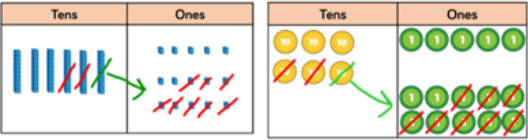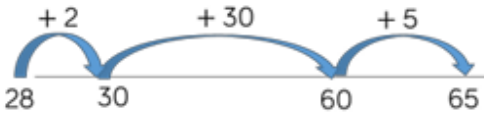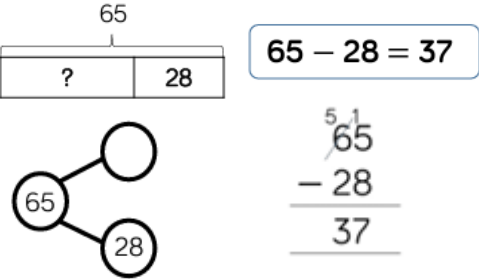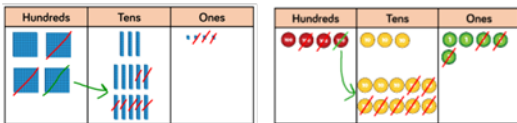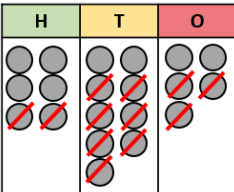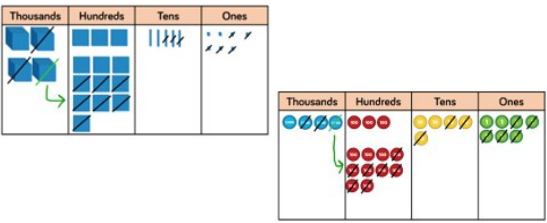| Skill Year Group	Concrete	Pictorial	Abstract
Adding 1-digit and 2-digit numbers to 100 Year 2	Children should be encouraged to count on from the larger number. Begin with familiar manipulatives that have been used so far and progress onto base 10. Large number squares and number lines may be useful.	Use of number lines, number tracks, hundred squares etc. could help to show bonds to 10 .	Progress to using numerals in the part whole models and transforming the tens frames into bar models. End result will be writing a number sentence. $38 + 5 = 43$
Adding two 2-digit numbers to 100 Year 2 / Year 3	Use of base 10 to begin to show the exchange of ones cubes to a tens stick. Familiar representatives could also be used if appropriate. Place value counters may be introduced if children are secure in the value of one and ten.	Blank number lines to allow counting on are essential with children encouraged to jump up in tens to become more efficient.	End result will be writing a number sentence to represent the concrete/pictorial method. Year 3 will use the formal written method when calculating alongside the base 10 and place value counter representations. $\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \scriptstyle 1 \end{array}$ $38 + 23 = 61$
Adding numbers with up to 3 digits Year 3	Use of base 10 and moving onto place value counters when children are secure in understanding the value of the counters.	Children could use a place value chart with drawn marks/counters to support the concrete or blank number lines, encouraging children to jump up in hundreds and tens.	Children should be beginning to represent their calculation as a formal written method for addition. $\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ \scriptstyle 1 \end{array}$

Addition
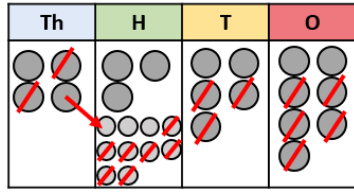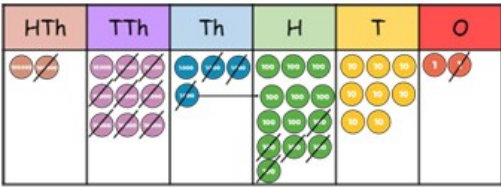
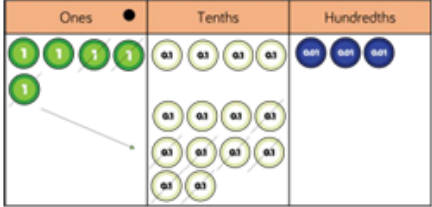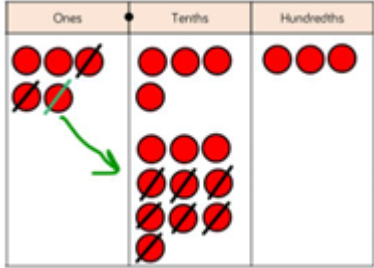| Skill Year Group	Concrete	Pictorial	Abstract
Adding numbers with up to 4 digits Year 4	Base 10 and place value counters to enable children to see the link to the formal written method. 	Children could use a place value chart with drawn marks/counters to support the concrete or blank number lines, encouraging children to jump up in hundreds and tens. 	Children must be using a formal written method as an end result.
Adding numbers with more than 4 digits Year 5	Place value counters to enable children to see the link to the formal written method. 	Drawn counters on a place value grid or a blank place value grid to enter numbers on to. 	Children should be encouraged to work in the abstract form with concrete and pictorial being used to supplement understanding if necessary. Formal written method is essential at this stage.
Adding with up to 3 decimal places Year 5	Understanding of the value of decimals is crucial and could be represented on tens frames for example. When children understand the value, use place value counters on a place value grid. 	Drawn counters on a place value grid if necessary. 	Children should be encouraged to work in the abstract form with concrete and pictorial being used to supplement understanding if necessary. Formal written method is essential at this stage. 3.65 $+ 2.41$ 6.06 1

Subtraction

Subtraction

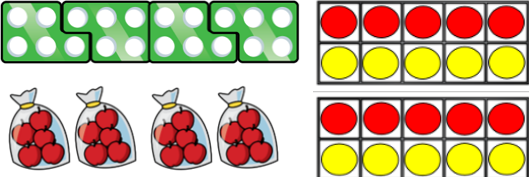| Skill Year Group	Concrete	Pictorial	Abstract
Subtract 1-digit numbers within 10 Year 1	Use of cubes, tens frames with counters etc. to show the physical action of reducing a number's size.	Part-whole models, tens frames and number tracks will support children in seeing the link from concrete.	Part-whole models, and transforming tens frames into bar models. End result to create a number sentence. $7 - 3 = 4$
Subtract 1 and 2-digit numbers to 20 Year 1/ Year 2	Counting back, using objects and number lines is crucial. Children will develop onto finding the number bond to 10 when partitioning the subtracted number.	Use of n umber lines, number tracks and visual representations of concrete resources. $14 - 6 = 8$	Part-whole models, bar models etc. with the end result being to create a number sentence. $14 - 6 = 8$
Subtract 1 and 2-digit numbers to 100 Year 2/ Year 3	Familiar representations to be used, including the use of base 10. Place value counters may be introduced if children are secure in the value of one and ten.	Children may begin using blank number lines to count back and find the difference. Encourage them to jump in multiples of 10. $+ 2$ $+ 30$ $+ 5$ 28 30 60 65	From year 3, children to use formal column method alongside concrete representation. $65 - 28 = 37$ $\begin{array}{r} 5\,1 \\ \cancel{6}5 \\ -\ 28 \\ \hline 37 \end{array}$
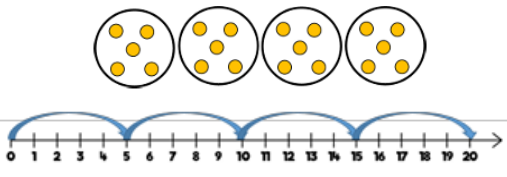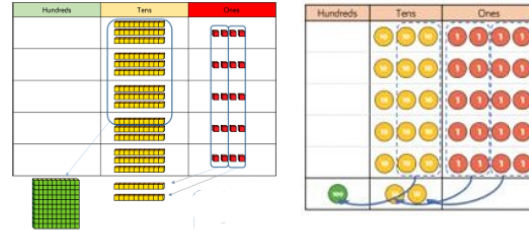
Subtraction

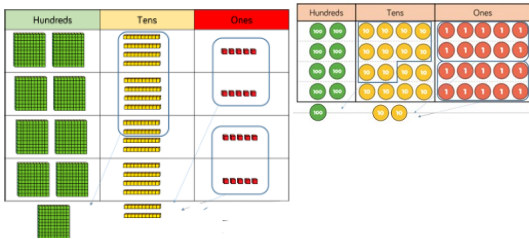| Skill Year Group	Concrete	Pictorial	Abstract
Subtract numbers with up to 3 digits Year 3	Base 10 and place value counters are the most effective manipulative to use when subtracting 3 digits. Ensure children understand the value of 1,10,100 etc before using.	Children could use a place value chart with drawn marks/counters to support the concrete or blank number lines, encouraging children to jump up in hundreds and tens.	Written column method to be used alongside the concrete resources so that the link can be easily seen.
Subtract numbers with up to 4 digits Year 4	Base 10 and place value counters are to be used at this stage.	Place value charts with drawn marks/counters could be used to support.	Written column method to be used alongside the concrete resources so that the link can be easily seen.
Subtract numbers with more than 4 digits Year 5	Place value counters (or plain counters on a place value grid) are crucial at this stage.	Drawn counters on a place value grid or a blank place value grid to enter numbers on to.	Children should be encouraged to work in the abstract form with concrete and pictorial being used to supplement understanding if necessary. Formal written method is essential at this stage.

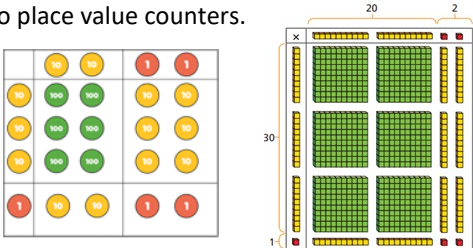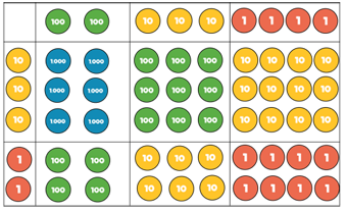| Subtraction			
Skill **Year Group**	**Concrete**	**Pictorial**	**Abstract**
Subtract with up to 3 decimal places Year 5	Understanding of the value of decimals is crucial and could be represented on tens frames for example. When children understand the value, use place value counters on a place value grid.	Drawn counters on a place value grid if necessary.	Children should be encouraged to work in the abstract form with concrete and pictorial being used to supplement understanding if necessary. Formal written method is essential at this stage. $\begin{array}{r} ^4\!5.^1\!43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$

Multiplication

Multiplication

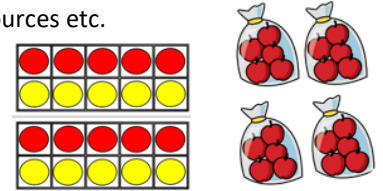| Skill Year Group	Concrete	Pictorial	Abstract
Solve 1-step problems using multiplication Year 1/2	Children to use concrete resources to represent problems in many different ways.	Pictorial representations to be used to represent the problems.	In year 1, there is no expectation for multiplication to be recorded formally. In year 2, the multiplication symbol is to be introduced. $$5 + 5 + 5 + 5 = 20$$ $$4 \times 5 = 20$$ $$5 \times 4 = 20$$
Multiply 2-digit by 1-digit numbers Year 3/4	Place value counters and base 10 to be used to support the understanding of the method.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	Informal methods and expanded method are used in year 3. Short multiplication should be introduced to year 4.
Multiply 3-digit numbers by 1-digit numbers Year 3/4	Base 10 and place value counters can be used to support the understanding of the written method. Limit the number of exchanged needed in the questions and move children away from resources when using larger numbers.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	When moving to 3 digit by 1 digit, short, formal written method is preferred.

Multiplication
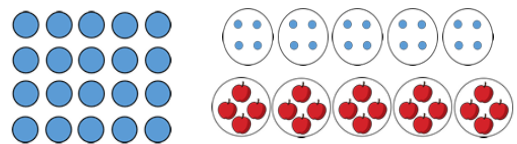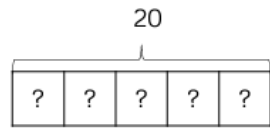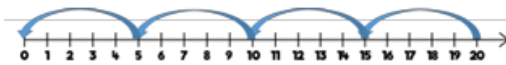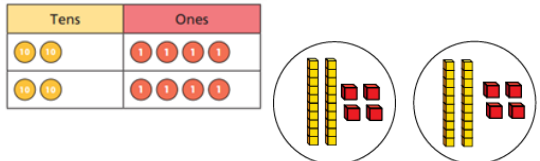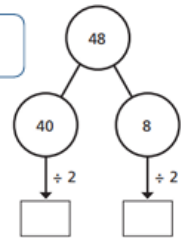
Skill Year Group	Concrete	Pictorial	Abstract
Multiply 4-digit numbers by 1-digit numbers Year 5	The best concrete resources to use at this stages are place value counters. These can be used to support the understanding of the formal written method.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	Formal written method to be used with multiplication grids used as a support for times tables id the children are struggling so that they can really focus on the method.
Multiply 2-digit by 2-digit numbers Year 5	Area models should be used initially to help the children understand the size of numbers they are using. Begin with Base 10 (as this leads nicely to finding the area of rectangle) and then move onto place value counters.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	The grid method shows clearly the link between the area models and the multiplication. Children should move onto the formal written method.
Multiply 3-digit numbers by 2-digit numbers Year 5	Children can continue to use area models with place value counters being the most efficient at this stage.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	Links to the grid method can be used with children moving onto the formal written method.

Multiplication

Skill Year Group	Concrete	Pictorial	Abstract
Multiply 4-digit numbers by 2-digit numbers Year 5/6	Area models could be used if children are still struggling to understand the mechanics of the calculation but at this stage children should be confident enough to move straight to formal written method.		Formal written method should be used at this stage. Children may be given a multiplication grid to help with their times tables if this is something they would benefit from. Consider where digits are placed and make sure this is consistent. | TTh	Th	H	T	O | |---|---|---|---|---|
	2	7	3	9
×			2	8
2	1	9	1	2
5	4	7	8	0
7	6	6	9	2	

Division

Division

Skill Year Group	Concrete	Pictorial	Abstract
Solve 1-step problems using multiplication (sharing) Year 1/2	Children are to solve problems by sharing amounts into equal groups. Use physical objects linked to topic, familiar concrete resources etc.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems. 20	In year 1, there is no expectation at this stage for children to record division formally. In year 2, children are to be introduced to the division symbol and how to represent the calculation in the abstract. $20 \div 5 = 4$
Solve 1-step problems using division (grouping) Year 1/2	Children solve problems by grouping an counting number of groups. This also helps children to see the link between multiplication and division. Use physical objects linked to topic, familiar concrete resources etc.	Grouping encourages children to count in multiples and links to repeated subtraction on a number line.	In year 1, there is no expectation at this stage for children to record division formally. In year 2, children are to be introduced to the division symbol and how to represent the calculation in the abstract. $20 \div 5 = 4$
Divide 2-digits by 1-digit (sharing with no exchange) Year 3	When dividing larger numbers, children are to use manipulatives that allow them to partition into tens and ones. Base 10 is a good concrete resource to start with, moving onto place value counters when confident.	Pictorial representations of concrete resources could be used to as a stepping stone between concrete and abstract, but is not necessary.	Part-whole models help to show a clear written method that matches the concrete representations. Children will represent the sum using the division symbol. $48 \div 2 = 24$
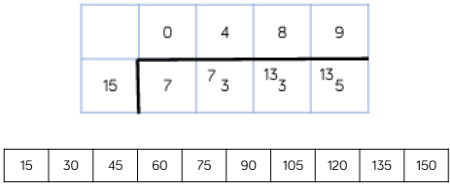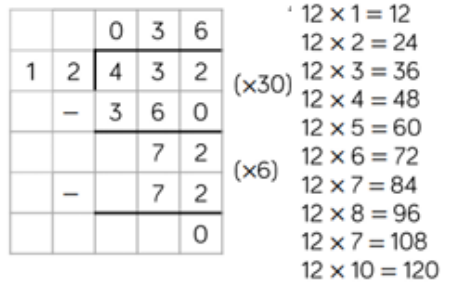
Division

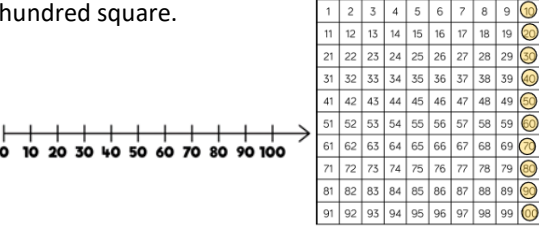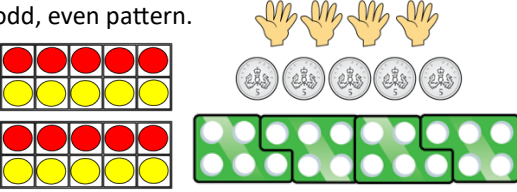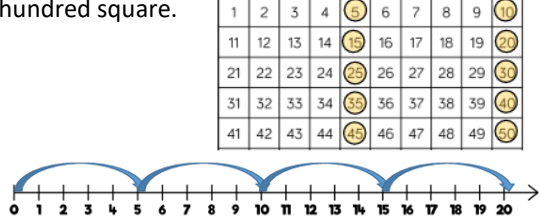| Skill Year Group	Concrete	Pictorial	Abstract
Divide 2-digits by 1-digit (sharing with exchange) Year 3/4	Children are to use base 10 and/or place value counters when needing to exchange during division.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems. 52	Flexible partitioning in a part-whole model supports this method and allows children to clearly see the links. The formal written method should be introduced at this stage. $52 \div 4 = 13$
Divide 2-digits by 1-digit (sharing with remainders) Year 3/4	Base 10 and/or place value counters should be used when exchanging is taking place. These manipulatives also clearly show the remainders which are left outside of the model after the equal groups have been made.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems. 53	Flexible partitioning in a part-whole model supports this method and allows children to clearly see the links. The formal written method should be introduced at this stage. $53 \div 4 = 13 \, r1$
Divide 2-digits by 1-digit (grouping) Year 4	Using place value counters and place value grids allow children to group by the divisor clearly starting with the largest place value. Remainders can be seen as the counters left ungrouped.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems.	The formal written method is essential at this stage. Language is important with children considering, for example, "How many groups of 4 tens can we make? And 'How many groups of 4 ones can be make?'

Division
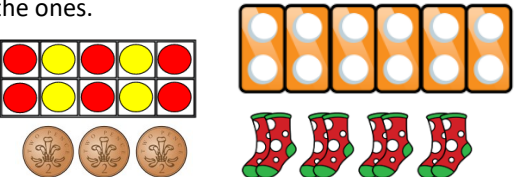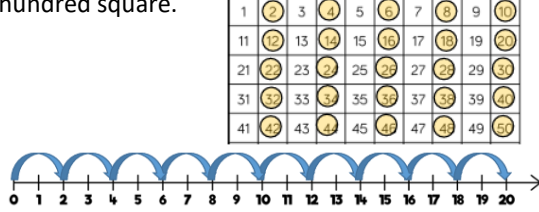
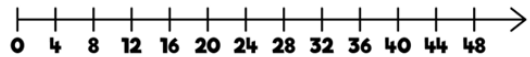| Skill Year Group	Concrete	Pictorial	Abstract
Divide 3-digits by 1-digit (sharing) Year 4	Continue to use place value counters to share into equal groups. This method of grouping equally between the rows (the largest place value first) helps to highlight remainders.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems. 856	Flexible partitioning in a part-whole model supports this method.
Divide 3-digits by 1-digit (grouping) Year 5	Children continue to use grouping to support their understanding of short division. Place value counters or plain counters on a place value grid are the most efficient concrete resources.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems.	At this stage, children should be using the formal written method for division as the abstract form of recording.
Divide 4-digits by 1-digit (grouping) Year 5	Place value counters or plain counters on a place value grid are the most efficient concrete resources.	Pictorial representations of the concrete could be used. Bar models also lend themselves well to division problems.	Children should be being encouraged to move away from concrete and pictorial representations at this stage and focus on the formal written method.

Division
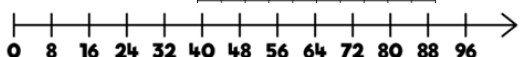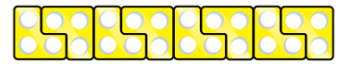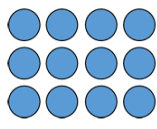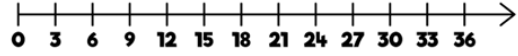
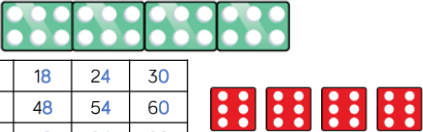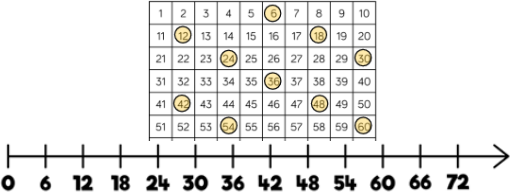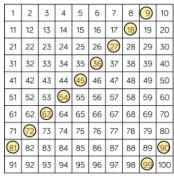| Skill Year Group	Concrete	Pictorial	Abstract
Divide multi-digits by 2 digits (short division) Year 6	Concrete and pictorial become less effective at this stage and children should be encouraged to use the formal written method for division.	Concrete and pictorial become less effective at this stage and children should be encouraged to use the formal written method for division.	Children may choose to write out their multiples to support their calculations, particularly with large remainders being 'carried'. Children should be solving word problems with remainders where the quotient can be rounded as appropriate.
Divide multi-digits by 2 digits (long division) Year 6	Concrete and pictorial become less effective at this stage and children should be encouraged to use the formal written method for division.	Concrete and pictorial become less effective at this stage and children should be encouraged to use the formal written method for division.	Children may choose to write out their multiples to support their calculations, particularly with large remainders being 'carried'. Children should be solving word problems with remainders where the quotient can be rounded as appropriate.

Times Tables
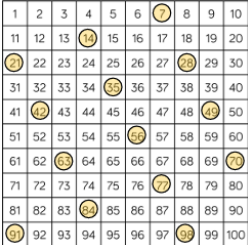
Times Tables

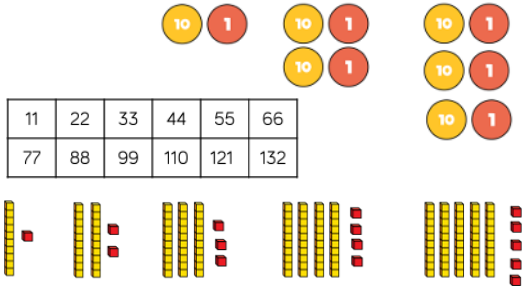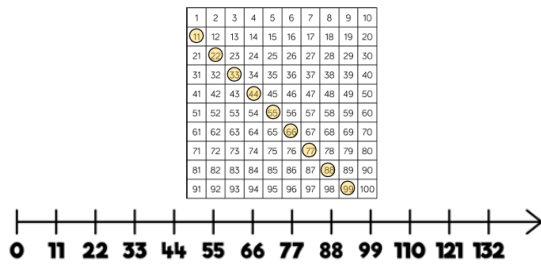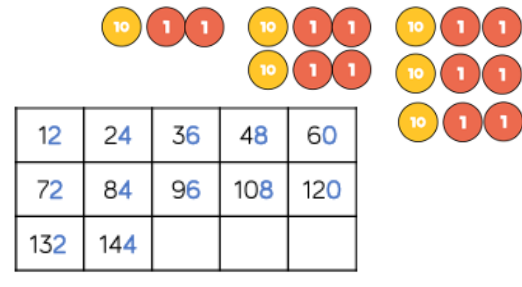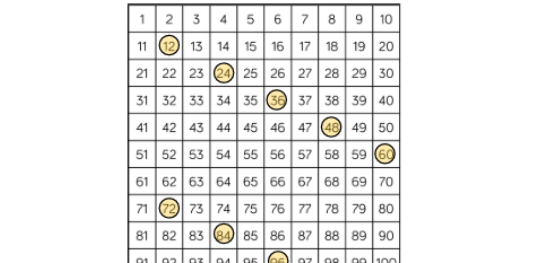| Skill Year Group	Concrete	Pictorial	Abstract
Recall and use multiplication and division facts for the 10-times table Year 2	Look for patterns in the times table using concrete resources to support. Notice the pattern in the digits—the ones are always zero and the tens increase by 1 each time.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 5-times table Year 2	Look for patterns in the times table using concrete resources to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 2-times table Year 2	Look for patterns in the times table using concrete resources to support. Notice how all of the numbers are even and there is a pattern in the ones.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.

https://www.ncetm.org.uk/classroom-resources/lv-multiplication/

Times Tables

Skill / Year Group	Concrete	Pictorial	Abstract
Recall and use multiplication and division facts for the 4-times table Year 3	Look for patterns in the times table using concrete resources to support. Make links to the 2 times table, seeing how each multiple is double the twos. Notice the ones within each group of five multiples. Highlight that all multiples are even using number shapes to support.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 8-times table Year 3	Look for patterns in the times table using concrete resources to support. Make links to the 4 times table, seeing how each multiple is double the fours. Highlight that all multiples are even using number shapes to support.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 3-times table Year 3	Look for patterns in the times table using concrete resources to support. Notice the odd, even, odd, even pattern using number shapes to support.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square. Highlight the pattern in the ones.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.

Times Tables

Skill Year Group	Concrete	Pictorial	Abstract
Recall and use multiplication and division facts for the 6-times table Year 4	Look for patterns in the six times table using concrete resources to support. Make links to the three times table, seeing how each multiple is double the threes. Highlight that all multiples are even numbers using shapes to support.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square. Highlight the pattern in the ones within each group of 5 multiples.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 9-times table Year 4	Look for patterns in the nine times table using concrete resources to support. Note the odd, even, odd, even pattern within the multiples.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square. Notice the pattern in the tens and ones using the number square to support.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
Recall and use multiplication and division facts for the 7-times table Year 4	There are no obvious patterns within the seven times tables, however, children should be familiar with many of the multiples due to commutativity. Children should be able to still see the odd, even pattern in the multiples.	Support the regular counting of forwards and backwards in multiples with a number line or a hundred square.	Verbal recall of the multiplication facts. Able to read and answer written multiplication facts.
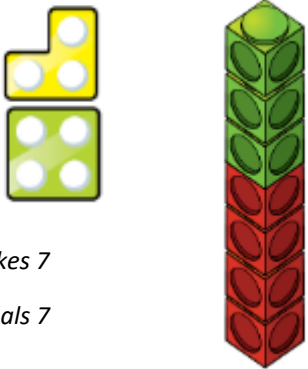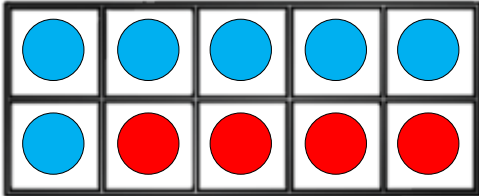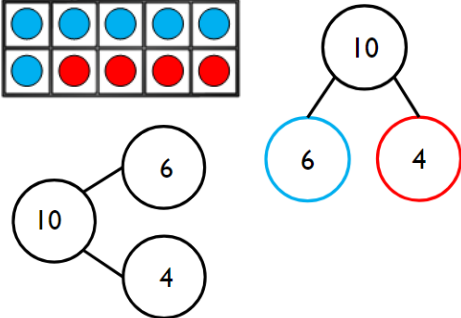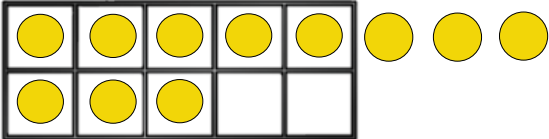
Times Tables

| Skill

Year Group	Concrete	Pictorial	Abstract
Recall and use multiplication and division facts for the 11-times table

Year 4 | Look for patterns in the eleven times table using concrete resources to support. Consider using concrete resources to show the pattern after crossing 100. | Support the regular counting of forwards and backwards in multiples with a number line or a hundred square. Notice the pattern in the tens and ones using the number square. | Verbal recall of the multiplication facts.

Able to read and answer written multiplication facts. |
| Recall and use multiplication and division facts for the 12-times table

Year 4 | Look for patterns in the twelve times table using concrete resources to support. Make links to the six times table noticing how each multiple is double the sixes. | Support the regular counting of forwards and backwards in multiples with a number line or a hundred square. Highlight the pattern showing the ones in every group of five multiples. | Verbal recall of the multiplication facts.

Able to read and answer written multiplication facts. |

EYFS
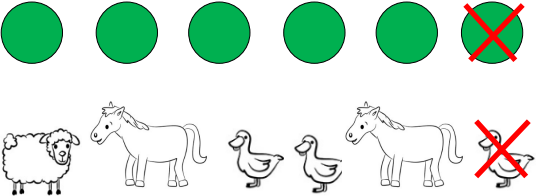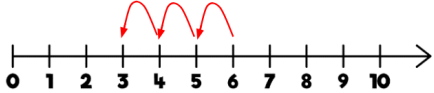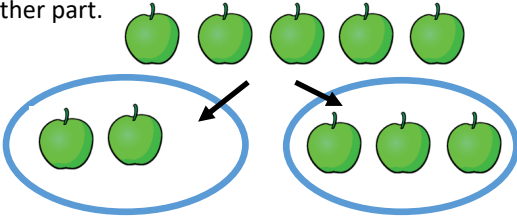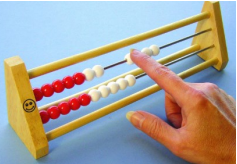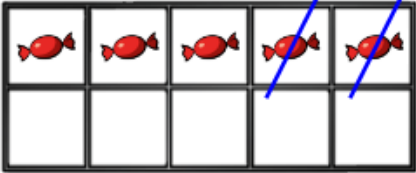
Addition

Skill Year Group	Concrete	Pictorial	Abstract
Counting and adding more	Using people or objects, children add one more to a group to find the new total—link to class topic 	Children add one more cube/counter/object linked to topic to a group to represent one more. Can we draw what has happened? *One more than 4 is 5*	Use number lines to understand how to link counting on with finding one more. *One more than 4 is 5* *5 is one more than 4* Start to add more than one and understand the link with counting. Could use counters or cubes initially and some may write a number sentence. 4 + 2 = 6
Understanding part-part-whole relationship	Using people or objects, sort them into parts and understand the relationship with the whole. *The parts are 3 and 3.* *The whole is 6.*	Draw pictures or diagrams to represent the parts and understand the relationship with the whole. The parts are 3 and 3. The whole is 6.	Use a part-whole model to represent the numbers. Some may progress onto writing a number sentence. 3 + 3 = 6
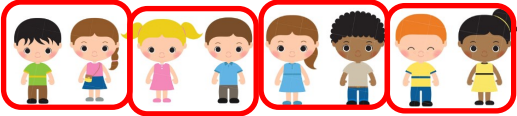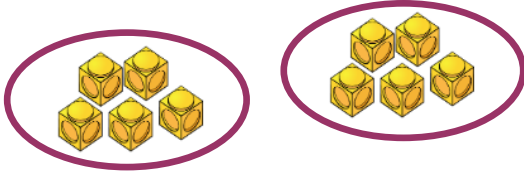
Addition

Skill Year Group	Concrete	Pictorial	Abstract
Knowing and finding number bonds within 10	Start with a group, break it apart and put back together again and form number bonds. *4 and 3 makes 7* *3 add 4 equals 7* *7 = 3 + 4*	Use five and tens frames to represent key number bonds. Start with using double sides counters/ cubes etc. and move to drawing onto frames. *6 + 4 = 10* *10 = 4 + 6*	Use the models from pictorial representation alongside a part-whole model. Show the number bonds. Make sure to include examples where one of the parts is 0.
Adding by counting on	Children to use their knowledge of counting to 20 to find a total by counting on using people or objects. E.g. There's already 8 children on the carpet. Count on as more children sit down. 	Use counters or drawings to represent their counting on strategy. 	

Subtraction

Skill Year Group	Concrete	Pictorial	Abstract
Counting back and taking away	Arrange people or objects and count how many we have. Remove 1 and see how many are left. *1 less that 6 is 5* *6 subtract 1 is 5*	Move onto drawing images and crossing out or using counters to represent objects. *There are _____ animals left.*	Children count back to take away and use a number line or number track to support the method. Some may move onto number sentences.
Finding a missing part, given a whole and a part	Separate a whole into two parts and understand how one part can be found by subtracting the other part. *8—5 = ?*		
Subtraction within 10	Understand when and how to subtract 1 from a number using an efficient method. Use familiar concrete resources and introduce the concept on a rekenrek. *E.g. 5—3 = 2*	Representations similar to those used throughout policy e.g. five or ten frames, number lines etc. *5—2 = 3*	Begin to move towards writing number sums which show understanding of number bonds within 10. *5—3 = 2*

Division, Doubling and Halving

| Skill

Year Group	Concrete	Pictorial	Abstract
Grouping	Learn to make equal groups from a whole and experiment with finding how many equal groups of a certain size can be made. Use people and objects sorting them into areas or hoops etc. *There are 8 children altogether.* *There are 2 in each group.* *There are 4 groups.*	Represent the whole and work out how many equal groups there are using drawings or small objects (e.g. counters) which represent a person or objects. *There are 10 in total* *There are 5 in each group.* *There are 42groups.*	
Sharing	Share a set of objects into equal parts and work out how many are in each part.		