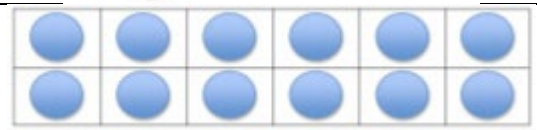
Woodland Academy Trust

Year 5 and Year 6 Calculation Document

Updated September 2021

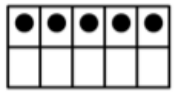
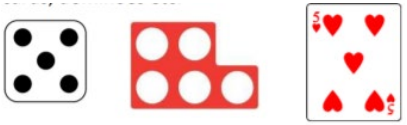
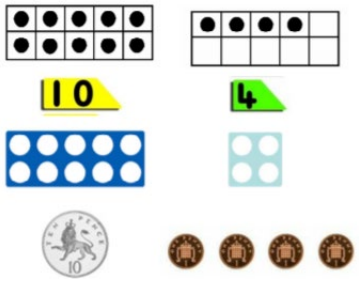
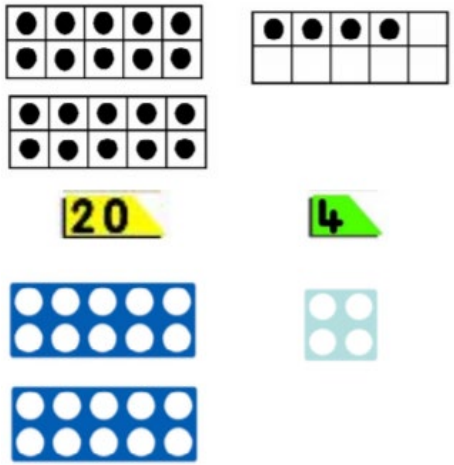
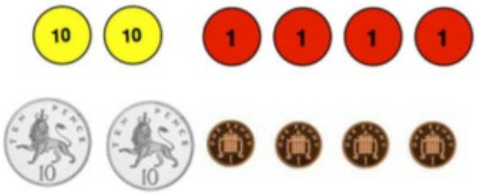
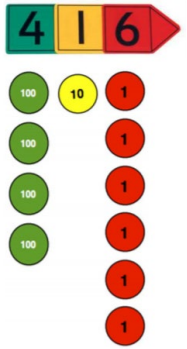
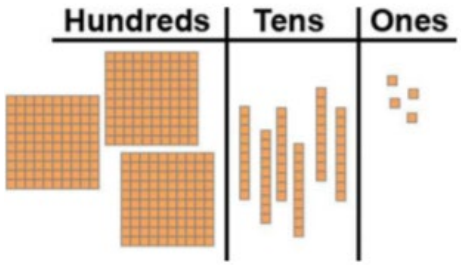
Progression in the use of manipulatives to support learning (How we support children's concrete understanding of maths)						
Foundation	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Real-life objects	Real-life objects	Mini-whiteboards	Mini-whiteboards	Mini-whiteboards	Mini-whiteboards	Mini-whiteboards
0 – 9 digit cards	0 – 9 digit cards	Place value cards			Protractors	Protractors
Number track/line to 20	Number line to 20 and 50	Number line to 100	Number line to 100	Number line including negative numbers	Number line including negative numbers	Number line including negative numbers
Meter/Counting stick	Meter/Counting stick	Meter/Counting stick	Meter/Counting stick	Meter/Counting stick	Meter/Counting stick	Meter/Counting stick
		Transparent rulers	Transparent rulers	Transparent rulers	Transparent rulers	Transparent rulers
Tens frame	Tens frame and hundred square	Tens frame and hundred square	Tens frame and hundred square	Tens frame and hundred square	Tens frame and hundred square	Tens frame and hundred square
Building blocks	Place value charts – Tens and ones	Place value charts – Ones to hundreds	Place value charts – Ones to Thousands	Place value charts – Ones to Ten thousands	Place value charts to a million and three decimal places	Place value charts to 10 million and three decimal places
Containers that are different shapes and sizes	Containers that are different shapes and sizes	Fraction bars, walls, circles (centralised storage)				
Numicon shapes	Numicon shapes/ Dienes	Dienes	Dienes	Dienes	Dienes	Dienes
Sorting hoops	Sorting hoops	Sorting hoops	Place value counters	Place value counters	Place value counters	Place value counters
Big Dice	Place value arrow cards – tens and ones	Place value arrow cards – tens and ones	Place value arrow cards – H, T, O	Place value arrow cards – H, T, O	Place value arrow cards	Place value arrow cards
Part-part-whole mat	Part-part-whole mat	Part-part-whole mat	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model
Transparent counters	Transparent counters	Transparent counters	Transparent counters	Transparent counters	Transparent counters	Transparent counters
Bar model with real-life objects	Bar model pictorial objects/ representative objects e.g. counters	Bar model with counters /Dienes progressing to numbers	Plastic mirrors	Plastic mirrors	Plastic mirrors	Plastic mirrors
Bead strings – ten	Bead strings – twenty/fifty	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred
Dice	Dice	Dice	Dice	Dice	Dice	Dice
Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods
Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters
Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount
Maths balances			Weighing scales			
Solid geometric shapes (centralised storage)						
Coins and notes (centralised storage)						
Clock (geared) (centralised storage)						

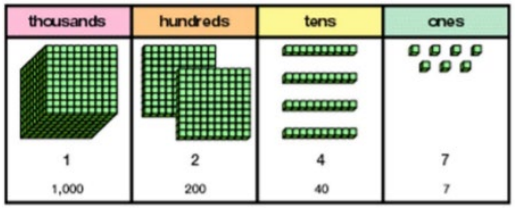
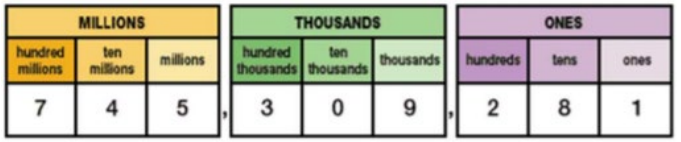
Maths Working Wall (How we use displays to support children's understanding of mathematical concepts)		
Build it	Where possible use a real-life/concrete representation of the concept, which children can see, touch and feel.	
Draw it	Show a pictorial representation of the concept.	
Solve it	Show a worked example with success criteria to represent the mathematical concept.	6 x 2 = 12 2 x 6 = 12 12 ÷ 2 = 6 12 ÷ 6 = 2 Factors of 12 are: 1, 2, 3, 4, 6 and 12
Practise it	Encourage children to practice the concept. Interactive opportunity – ask children to respond to questions, encourage them to add what they know, leave homework for children to take to master the concept.	1 x 2 = 2 2 x 2 = 4 3 x 2 = 6 etc.
Challenge it	Set a open-ended challenge to be solved. Interactive opportunity – leave real-life objects or manipulatives for children to use to help solve the challenge.	How many different ways can 12 eggs be arranged into arrays? What if you try 24 eggs?
Say it	Display and refer to the vocabulary related to the concept.	Multiply, multiplication , repeated addition, array, divide, group, multiples, factors

Classroom visual prompts (How we represent maths to the children pictorially)						
Foundation	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Big focus 10	Big focus 20	Big focus 100				
Place Value Chart 10	Place Value Chart 20	Place Value Chart 100	Place Value Chart Th- tenths	Place Value Chart Tth- Hundredths	Place Value Chart M- Thousandths	Place Value Chart M- Thousandths
Numicon number line with Numicon shapes	Numicon number line with Numicon shapes	Fractions number line	Fractions number line	Fractions and decimals number line	Fractions, decimals and percentages number line	Fractions, decimals and percentages number line
Odd and even numbers	Odd and even numbers	Odd and even numbers	Factors and multiples	Factors and multiples	Factors, prime and composite numbers	Number properties
	Number bonds to 10 Number bonds to 20	Number bonds to 10 Multiples of 10 totalling 100	Number bonds to 10 Multiples of 10 totalling 100			
0 – 20 number line / track	0 -50 number line	0 – 100 number line	Number line to 100	Number line including negative numbers	Number line including negative numbers	Number line including negative numbers
	100 square	100 square	100 square	100 square	100 square	100 square
Number names from 0 - 10	Number names of multiples of 10	Number names from 0 – 100	Number names from 0 - 1000	Number names to hundred thousands	Number names to one million	Number names to million
Real coins and Large coins	Real coins and Large coins	Real coins and Large coins	Real coins and Large coins	Real coins and Large coins	Real coins and Large coins	Real coins and Large coins
Counting in 1s and 2s	2, 5 and 10 multiplication tables	2, 4 and 8 multiplication tables	3, 6 and 12 multiplication tables	7, 9 and 11 multiplication tables All multiplication tables up to 12 x 12	All multiplication tables up to 12 x 12	All multiplication tables up to 12 x 12
Counting in 1s and 2s multiplication table patterns and divisibility rules and connections.	2, 5 and 10 multiplication table patterns and divisibility rules and connections. Display after introducing the times tables to the children.	2, 4 and 8 multiplication table patterns and divisibility rules and connections. Display after introducing the times tables to the children.	3, 6 and 12 multiplication table patterns and divisibility rules and connections. Display after introducing the times tables to the children.	All multiplication table patterns and divisibility rules Connections between 5/10, 3/6/12, 2/4/8 Also focus on 1, 7, 9 and 0 multiplication table.	All multiplication table patterns and divisibility rules Connections between 5/10, 3/6/12, 2/4/8 Also focus on 1, 7, 9 and 0 multiplication table. Square and cube numbers	All multiplication table patterns and divisibility rules Connections between 5/10, 3/6/12, 2/4/8 Also focus on 1, 7, 9 and 0 multiplication table. Square and cube numbers
			Roman numerals	Roman numerals	Roman numerals	Roman numerals
The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to	The = sign means not an answer but is equivalent to
2D and 3D shapes	2D and 3D shapes	2D and 3D shapes	2D and 3D shapes	2D and 3D shapes	2D and 3D shapes	2D and 3D shapes

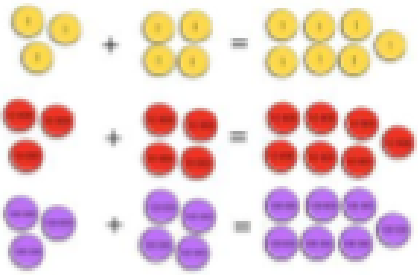
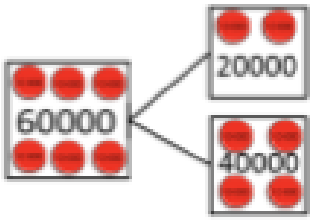
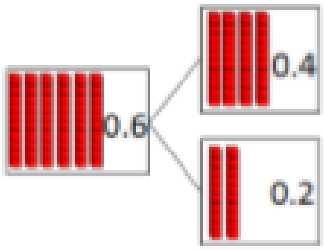
	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.
Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays 2d × 1d using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first(up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too

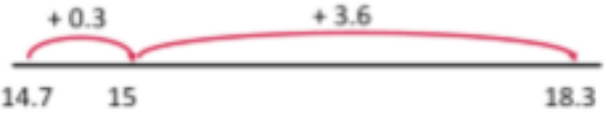
Progression in the teaching of place value

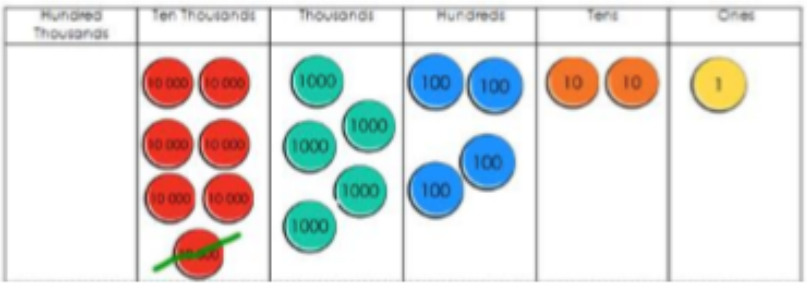
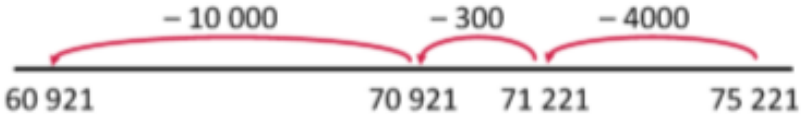
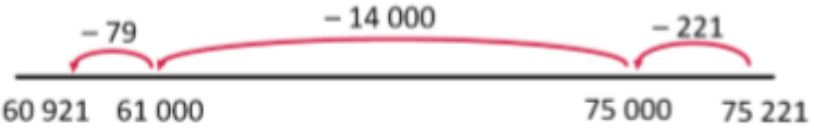
Foundation	Year 1	Year 2	Year 3 onwards
Understanding ten	Understanding numbers up to 20	Understanding numbers up to one hundred	Understanding numbers up to one thousand
A TENS FRAME is a simple maths tool that helps children: • Keep track of counting • See number relationships • Learn addition to 10 • Understand place value Use tens frames flash cards daily to ensure children recognise amounts. Use empty tens frames to fill with counters to enable children to understand number relationships. Either fill the tens frame in pairs or in rows. In rows shows 5 as a benchmark. Children can easily see more than 5 or less.  Setting the counters in pairs, naturally allows the children to see addition concepts. Include other visual images such as dice, cards, dominoes etc. 	'Ten' is the building block of our Base 10 numeration system. Young children can usually 'read' two-digit numbers long before they understand the effect the placement of each digit has on its numerical value. A child might be able to correctly read 62 as sixty two and 26 as twenty-six, and even know which number is larger, without understanding why the numbers are of differing values. Ten-frames can provide a first step into understanding two-digit numbers simply by the introduction of a second frame. Placing the second frame to the right of the first frame, and later introducing numeral cards, will further assist the development of place value understanding. 	Continue developing place value through the use of tens frames.  	Continue developing place value through the use of manipulatives including recognising 416 as 41 tens and 6 ones which is equivalent to 416 ones which is equivalent to four hundreds and one ten and six ones  Use Dienes blocks and place value charts 

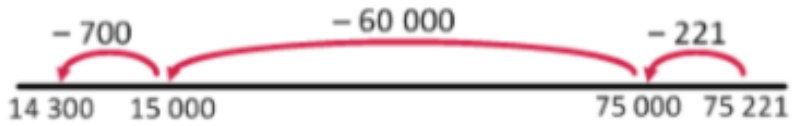
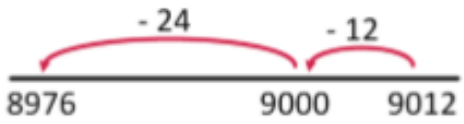
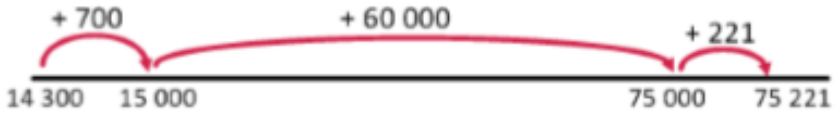
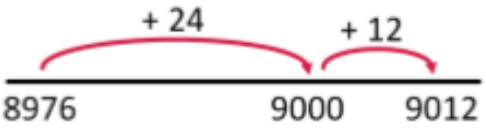
Progression in the teaching of place value		
Year 4	**Year 5**	**Year 6**
Understanding numbers up to ten thousand	**Understanding numbers up to one million including decimals**	**Understanding numbers beyond one million including decimals**
Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters • Dienes blocks • Place value charts  Continue developing place value through the use of manipulatives including recognising the number above as one thousand plus two hundred plus four tens plus seven ones is equivalent to twelve hundred plus 47 ones etc. The children must also be able to identify that this number is also 12,470 tenths	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimal counters) • Dienes blocks • Place value charts  They need to understand that there are no ten thousands in this number. The value of the digit 9 is nine thousand but there are three hundred and nine thousands in this number. They need to be able to recognise the value of the digit and the number and know that these are different. They also need to know how many tenths and hundredths are in this number 3092810 tenths and 30928100 hundredths in this number.	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimals counters) • Dienes blocks • Place value charts  They need to understand that there are no ten thousands in this number. The value of the digit 9 is nine thousand but there are 745309 thousands in this number. They need to be able to recognise the value of the digit and the number and know that these are different. They also need to know how many tenths, hundredths and thousandths there are in this number 7453092810 tenths and 74530928100 hundredths and 745309281000 thousandths in this number.

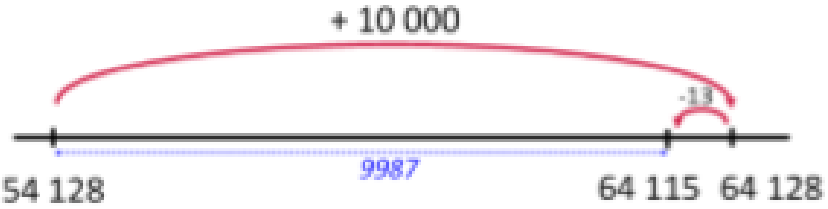
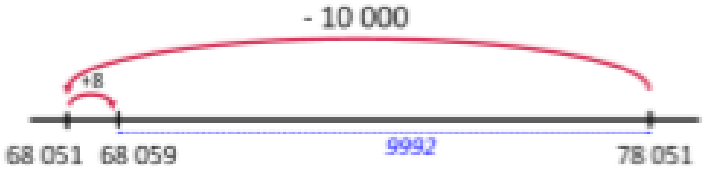
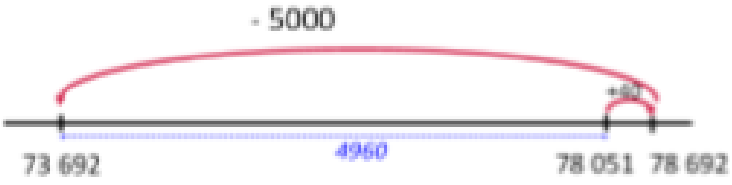
Y5 and Y6 Addition & Subtraction

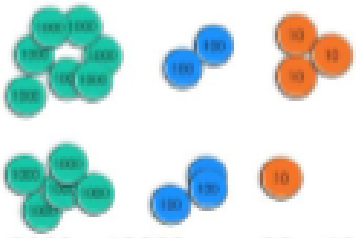
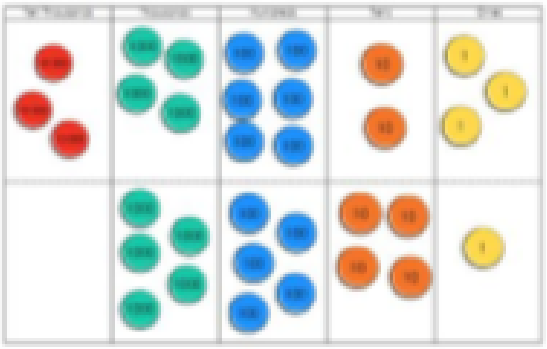
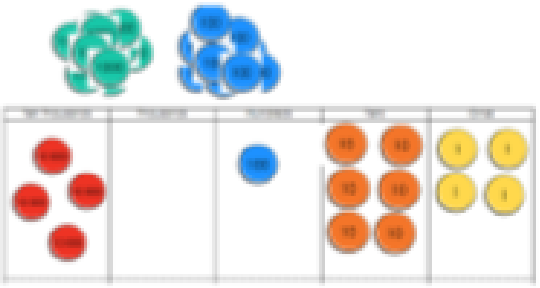
Strategies & Guidance	CPA
Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 *Skip counting forwards and backwards in steps of powers of 10 (i.e. 10, 100, 1000, 10 000 and 100 000) should be incorporated into transition activities and practised regularly.* *In Year 5 pupils work with numbers up to 1 000 000 as well as tenths, hundredths and thousandths.* *In Year 6 pupils work with numbers up to 10 000 000.*	Support with place value counters on a place value chart, repeatedly adding the same counter and regrouping as needed.  Counting sticks and number lines:   Pay particular attention to boundaries where regrouping happens more than once and so more than one digit changes. e.g. 9900 + 100 = 10 000 or 99 000 + 1000 = 100 000
Using known facts and understanding of place value to derive *Using the following language makes the logic explicit: I know three ones plus four ones is equal to seven ones. Therefore, three ten thousands plus four ten thousands is equal to seven ten thousands.* *In Year 5 extend to multiples of 10 000 and 100 000 as well as tenths, hundredths and thousandths.* *In Year 6 extend to multiples of one million.* *These derived facts should be used to estimate and check answers to calculations.*	 3 + 4 = 7 30 000 + 40 000 = 70 000 300 000 + 400 000 = 700 000 20 000 + 40 000 = 60 000 40 000 + 20 000 = 60 000 60 000 - 40 000 = 20 000 60 000 - 20 000 = 40 000   0.6 = 0.2 + 0.4 0.6 = 0.4 + 0.2 0.2 = 0.6 - 0.4 0.4 = 0.6 - 0.2

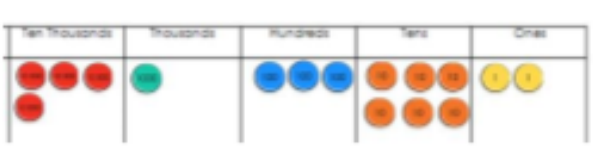
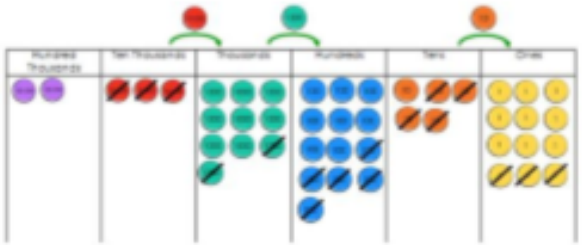
Strategies & Guidance	CPA
Partitioning one number and applying known facts to add. *Pupils can use this strategy mentally or with jottings as needed.* *Pupils should be aware of the range of choices available when deciding how to partition the number that is to be added.* *They should be encouraged to count on from the number of greater value as this will be more efficient. However, they should have an understanding of the commutative law of addition, that the parts can be added in any order.* *Pupils have experience with these strategies with smaller numbers from previous years and so the focus should be on developing flexibility and exploring efficiency.*	**Partitioning into place value amounts (canonical partitioning):** 4650 + 7326 = 7326 + 4000 + 600 + 50  With place value counters, represent the larger number and then add each place value part of the other number. The image above shows the thousands being added. Represent pictorially with an empty numberline:  **Partitioning in different ways (non-canonical partitioning):** Extend the 'Make ten' strategy (see guidance in Y1 or Y2) to count on to a multiple of 10. 6785 + 2325 = 6785 + 15 + 200 + 2110  The strategy can be used with decimal numbers, Make one: 14.7 + 3.6 = 14.7 + 0.3 + 3.3 = 15 + 3.3 

Strategies & Guidance	CPA
Subtraction by partitioning and applying known facts. *Pupils can use this strategy mentally or with jottings as needed.* *Pupils should be aware of the range of choices available when deciding how to partition the number that is to be subtracted.* *Pupils have experience with these strategies with smaller numbers from previous years and so the focus should be on developing flexibility and exploring efficiency.*	**Partitioning into place value amounts (canonical partitioning):** 75 221 – 14 300 = 75 221 – 10 000 – 4000 – 300  Represent pictorially with a number line, starting on the right and having the arrows jump to the left:  Develop understanding that the parts can be subtracted in any order and the result will be the same:  **Partitioning in different ways (non-canonical partitioning):** Extend the 'Make ten' strategy (see guidance in Y1 or Y2) to count back to a multiple of 10. 

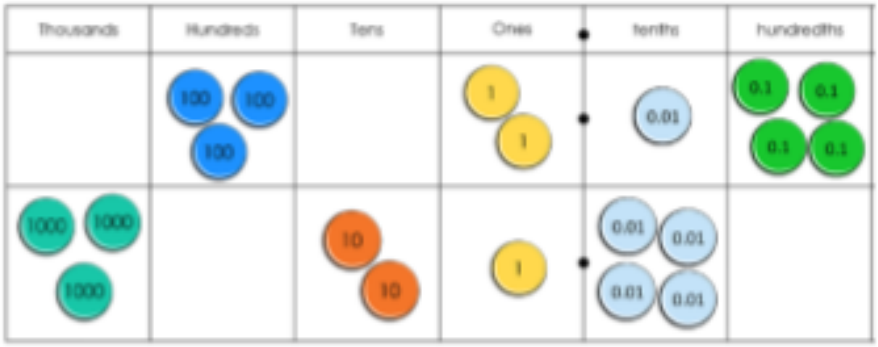
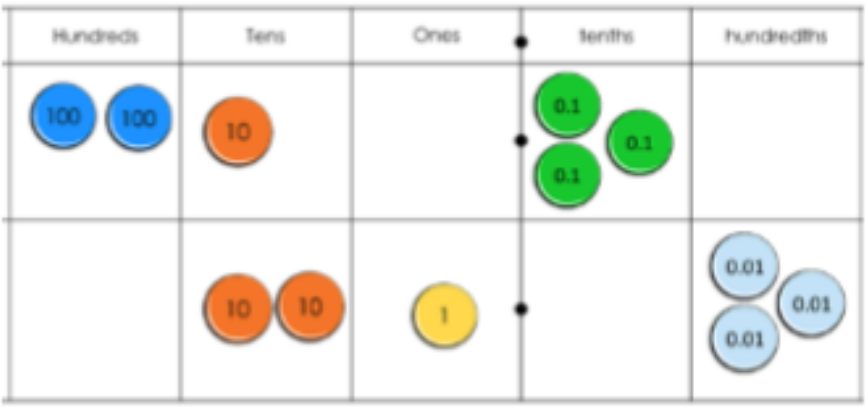
Strategies & Guidance	CPA
Calculate difference by "counting back" *It is interesting to note that finding the difference is reversible. For example, the difference between 5 and 2 is the same as the difference between 2 and 5. This is not the case for other subtraction concepts.*	75 221 – 14 300 Place the numbers either end of a numberline and work out the difference between them. Select efficient jumps.  Finding the difference is efficient when the numbers are close to each other: 9012 – 8976 
Calculate difference by "counting on" *Addition strategies can be used to find difference.*	75 221 – 14 300  Finding the difference is efficient when the numbers are close to each other 9012 – 8976 

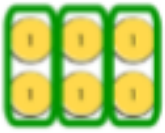
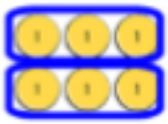
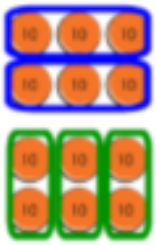
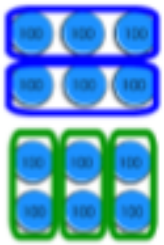
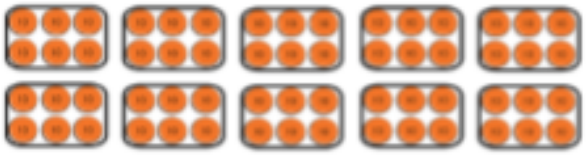
Strategies & Guidance	CPA
Round and adjust **Addition and subtraction using compensation** *Pupils should recognise that this strategy is useful when adding and subtracting near multiples of ten. They should apply their knowledge of rounding.* *It is very easy to be confused about how to adjust and so visual representations and logical reasoning are essential to success with this strategy.*	**Addition**  54 128 + 9987 = 54 128 + 10 000 − 13 = 64128 - 13 Pupils should realise that they can adjust first:  54128 + 9987 = 54128 − 13 + 10 000 = 54 115 + 10 000 **Subtraction**  78 051 − 9992 = 78 051 − 10 000 + 8 = 68 051 + 8 Pupils should realise that they can adjust first:  78 051 − 4960 = 78 051 + 40 − 5000 = 78 692 - 5000
Near doubles *Pupils should be able to double numbers up to 100 and use this to derive doubles for multiples of ten as well as decimal numbers. These facts can be adjusted to calculate near doubles.*	160 + 170 = double 150 + 10 + 20 160 + 170 = double 160 + 10 or 160 + 170 = double 170 - 10 2.5 + 2.6 = double 2.5 + 0.1

Strategies & Guidance	CPA
Partition both numbers and combine the parts *Pupils should be secure with this method for numbers up to 10 000, using place value counters or Dienes to show conceptual understanding.* *If multiple regroupings are required, then pupils should consider using the column method.*	7230 + 5310 = 12 000 + 500 + 40 200 + 300 = 500  7000 + 5000 = 12000 30 + 10 = 40 Pupils should be aware that the parts can be added in any order.
Written column methods for addition *In Year 5, pupils are expected to be able to use formal written methods to add whole numbers with more than four digits as well as working with numbers with up to three decimal places.* *Pupils should think about whether this is the most efficient method, considering if mental methods would be more effective.* *Continue to use concrete manipulatives alongside the formal method.* *When adding decimal numbers with a different number of decimal places, in order to avoid calculation errors, pupils should be encouraged to insert zeros so that there is a digit in every row. This is not necessary for calculation and these zeros are not place holders as the value of the other digits is not changed by it being placed.* *Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.*	For this method start with the digit of least value because if regrouping happens it will affect the digits of greater value. 3 4 6 2 3 + 5 5 4 1  Combine the counters in each column and regroup as needed: 3 4 6 2 3 + 5 5 4 1 1 1 4 0 1 6 4  Decimal numbers: 3 4 . 2 5 1 5 . 4 + 6 . 3 6 2 1 1 5 6 . 0 1 2 

Strategies & Guidance	CPA
Written column methods for subtraction *In Year 5, pupils are expected to be able to use formal written methods to subtract whole numbers with more than four digits as well as working with numbers with up to three decimal places.* *Pupils should be given plenty of practice with calculations that require multiple separate instances of regrouping.* *In Year 3 and 4 they become more familiar with calculations that require 'regrouping to regroup'. Understanding must be secured through the considered use of manipulatives and images, combined with careful use of language.* *Pupils should think about if this is the most efficient method, considering whether mental strategies (such as counting on, using known number facts, compensation etc.) may be likelier to produce an accurate solution.* *Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.*	4 1 3 6 2 - 3 2 2 4 3  3 1 5 1 4 1 3 6 2 - 3 2 2 4 3 9 1 1 9  The term regrouping should be the language used. You can use the terms 'exchange' with subtraction but it needs careful consideration. You can regroup 62 as 50 and 12 (5 tens and 12 ones) instead of 60 and 2 (6 tens and 12 ones). Or you can 'exchange' one of the tens for 10 ones resulting in 5 tens and 12 ones. If you have exchanged, then the number has been regrouped.

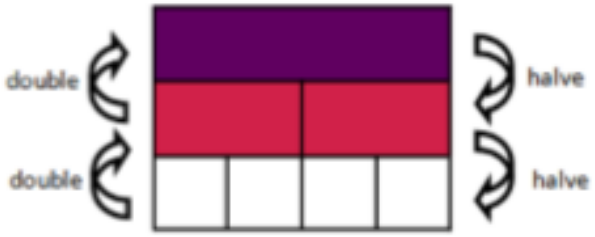
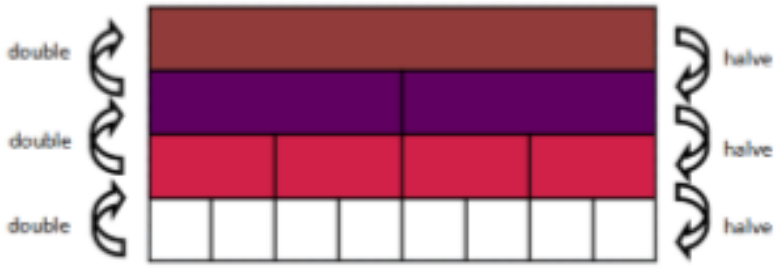
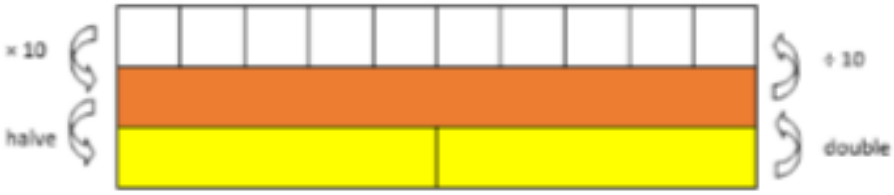
Y5 and Y6 Multiplication

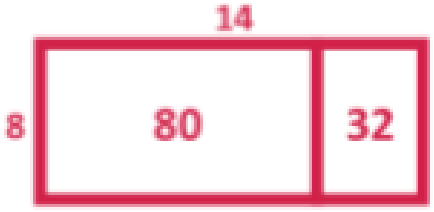
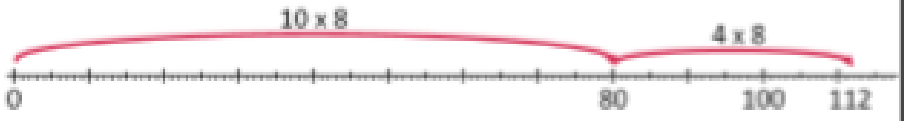
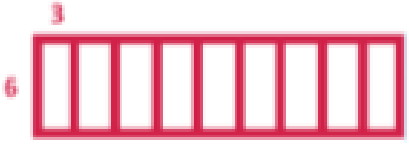
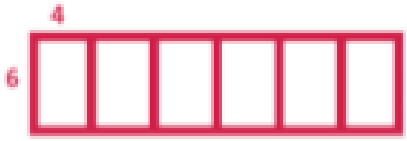
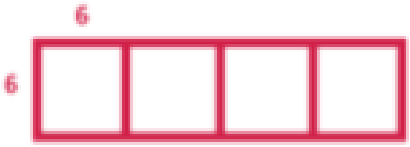
Strategies & Guidance	CPA
Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 *Avoid saying that you "add a zero" when multiplying by ten and instead use the language of place holder.* *Use place value counters and charts to visualise and then notice what happens to the digits.*	When you multiply by ten, each part is ten times greater. The ones become tens, the tens become hundreds, etc. When multiplying whole numbers, a zero holds a place so that each digit has a value that is ten times greater. 102.14 x 10 = 1021.4  When you divide by ten, each part is ten times smaller. The hundreds become tens and the tens become ones. Each digit is in a place that gives it a value that is ten times smaller. When dividing multiples of ten, a place holder is no longer needed so that each digit has a value that is ten times smaller. E.g. 210 ÷ 10 = 21 210.3 ÷ 10 = 21.03 

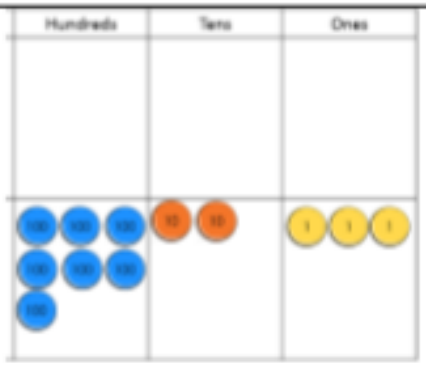
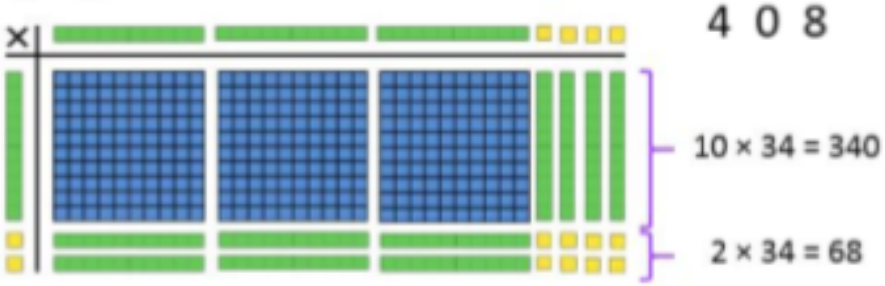
Strategies & Guidance	CPA
Using known facts and place value to derive multiplication facts *Emphasis is placed on understanding the relationship (10 times or 100 times greater) between a known number fact and one to be derived, allowing far larger 'fact families' to be derived from a single known number fact.* *Knowledge of commutativity is further extended and applied to find a range of related facts.* *Pupils should work with decimals with up to two decimal places.* *These derived facts should be used to estimate and check answers to calculations.*	  2 x 3 = 6 3 x 2 = 6 2 x 30 = 60 30 x 2 = 60   2 x 3 x 10= 60 3 x 20 = 60 20 x 3 = 60 2 x 300 = 600 300 x 2 = 600  3 x 200 = 600 200 x 3 = 600 2 x 30 x 10 = 600 20 x 3 x 10 = 600  30 20 600 20 x 30 = 600 30 x 20 = 600

These are the multiplication facts pupils should be able to derive from a known fact

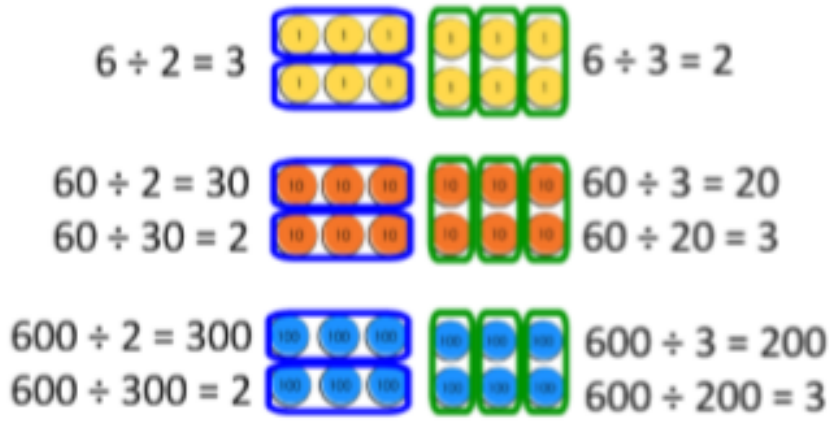
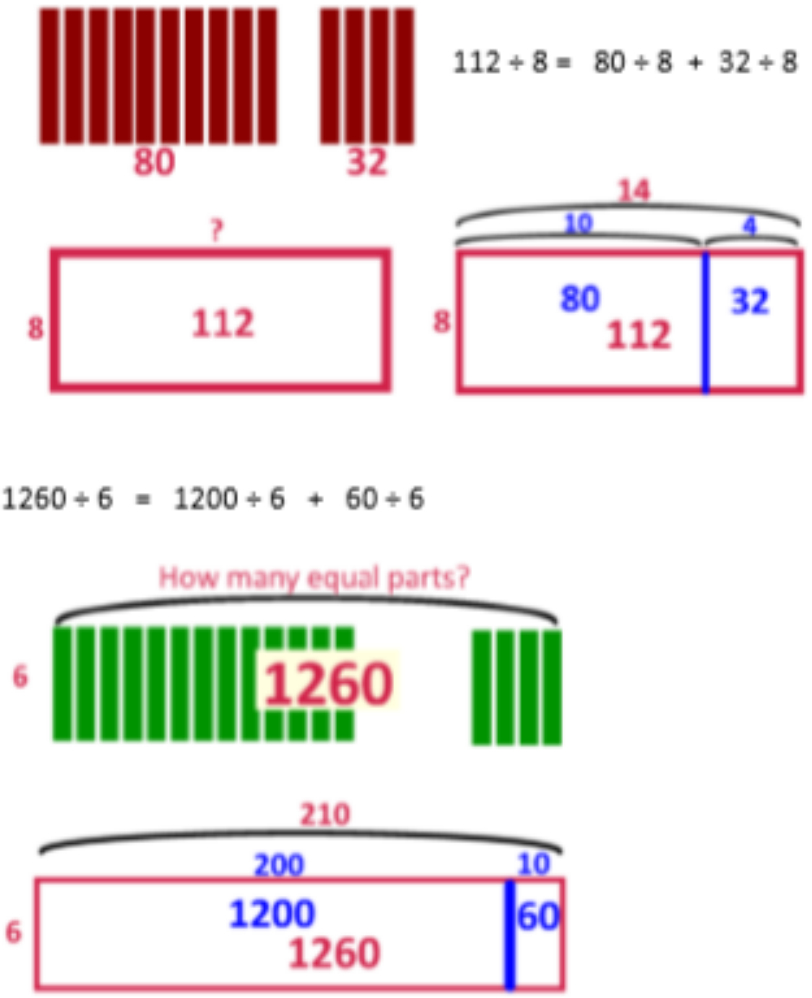
2 100 000		700 000 x 3	70 000 x 30	7000 x 300	700 x 3000	70 x 30 000	7 x 300 000
210 000		70 000 x 3	7000 x 30	700 x 300	70 x 3000	7 x 30 000	
21 000		7000 x 3	700 x 30	70 x 300	7 x 3000		
2100		700 x 3	70 x 30	7 x 300			
210		70 x 3	7 x 30				
21	=	**7 x 3**					
2.1		0.7 x 3	7 x 0.3				
0.21		0.07 x 3	0.7 x 0.3	7 x 0.03			
0.021		0.007 x 3	0.07 x 0.3	0.7 x 0.03	7 x 0.003		

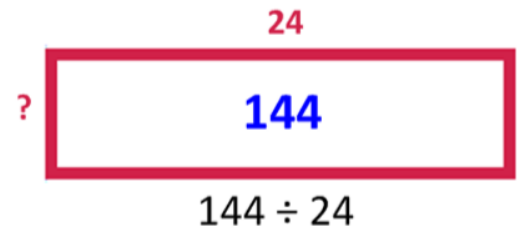
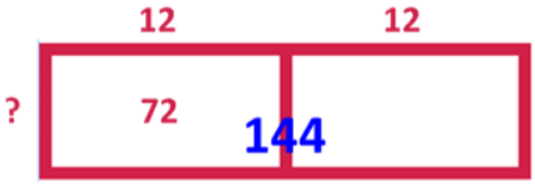
Strategies & Guidance	CPA
Doubling and halving *Pupils should experience doubling and halving larger and smaller numbers as they expand their understanding of the number system.* *Doubling and halving can then be used in larger calculations.*	 **Multiply by 4** by doubling and doubling again e.g. 16 × 4 = 32 × 2 = 64 **Divide by 4** by halving and halving again e.g. 104 ÷ 4 = 52 ÷ 2 = 26  **Multiply by 8** by doubling three times e.g. 12 × 8 = 24 × 4 = 48 × 2 = 96 **Divide by 8** by halving three times e.g. 104 ÷ 8 = 52 ÷ 4 = 26 ÷ 2 = 13  **Multiply by 5** by multiplying by 10 then halving, e.g. 18 × 5 = 180 ÷ 2 = 90. **Divide by 5** by dividing by 10 and doubling, e.g. 460 ÷ 5 = double 46 = 92

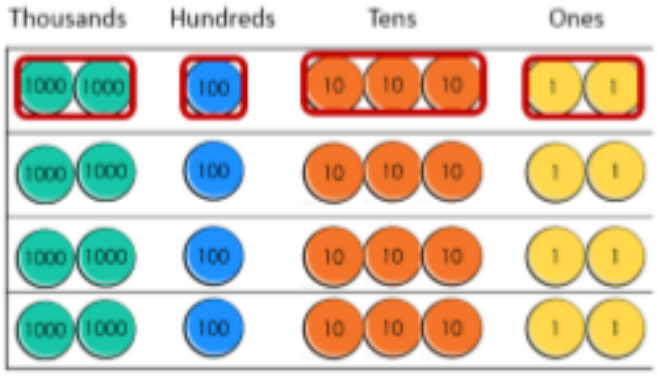
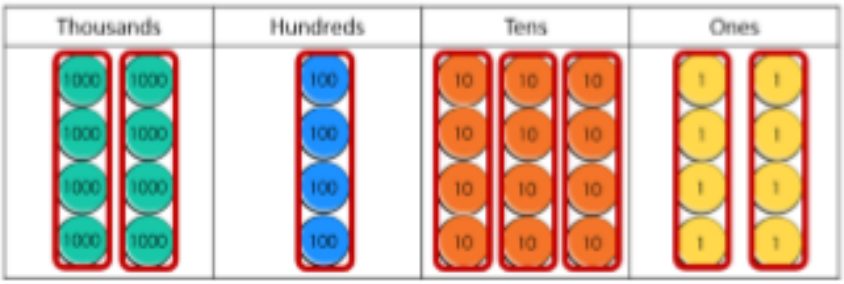
Strategies & Guidance	CPA
Multiply by partitioning one number and multiplying each part **Distributive law** **a x (b + c) = a x b + a x c** Build on pupils' understanding of arrays of counters to represent multiplication to see that area models can be a useful representation:	8 x 14 = 8 x 10 + 8 x 4  Cuisenaire rods to build arrays  Represent with area model  Jottings on a number line Bead string where each bead has a value of 8: 
Using knowledge of factors *In Year 5 pupils are expected to be able to identify factor pairs and this knowledge can be used to calculate.* *Pupils will be using the commutative and associative laws of multiplication.* **Commutative law** **a x b = b x a** **Associative law** **a x b x c = (a x b) x c** **= a x (b x c)** *They should explore and compare the different options and choose the most efficient order to complete calculations.*	Calculate 6 x 24 by using factor pairs of 24 Two and twelve are factors of 24: 6 x 2 x 12  6 x 12 x 2  Three and eight are factors of 24: 6 x 3 x 8  6 x 8 x 3  Four and six are factors of 24: 6 x 4 x 6  6 x 6 x 4 

Strategies & Guidance	CPA
Formal written method of short multiplication *Conceptual understanding is supported by the use of place value counters, both during teacher demonstrations and during their own practice.* *Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.*	241 x 3 723 1 
Multiplying by a 2-digit number **Formal written method of long multiplication** *In Year 6 pupils are extended from multiplication by a 1-digit number to multiplication by a 2-digit number.* *Extend the place value chart model used in Year 4, using an additional row on the place value chart.* *Extend understanding of the distrubitive law to develop conceptual understanding of the two rows of the formal written method.* *Dienes blocks can be used to construct area models to represent this.*	243 x 12 486 2430  34 × 12 68 340 408 12 × 34 

Y5 and Y6 Division

Strategies & Guidance	CPA
Deriving facts from known facts *Pupils use their growing knowledge of multiplication facts, place value and derived facts to multiply mentally.* *Understanding of the inverse relationship between multiplication and division allows corresponding division facts to be derived.*	
Using knowledge of multiples to divide *Using an area model to partition the whole into multiples of the divisor (the number you are dividing by).*	

Strategies & Guidance	CPA
Using knowledge of factors to divide *Pupils explore this strategy when using repeated halving.* *2 x 2 = 4 and so if you divide by 4 the same result can be achieved by dividing by two and then by two again.*	 144 ÷ 24 I know 2 and 12 are a factor pair of 24 and so I can divide by 2 and then by 12.  144 ÷ 2 ÷ 12

Strategies & Guidance	CPA
Short division **Dividing a 4-digit numbers by 1-digit numbers** *The thought process of the traditional algorithm is as follows:* *How many 4s in 8? 2* *How many 4s in 5? 1 with 1 remaining so regroup.* *How many 4s in 12? 3* *How many 4s in 8? 2* *Warning: If you simply apply place value knowledge to each step, the thinking goes wrong if you have to regroup.* *How many 4s in 8000? 2000* *How many 4s in 500?* *100 with 1 remaining (illogical)* *The answer would be 125.* *Sharing the dividend builds conceptual understanding however doesn't scaffold the "thinking" of the algorithm.* *Using place value counters and finding groups of the divisor for each power of ten will build conceptual understanding of the short division algorithm.* *Area models are also useful representations, as seen with other strategies and exemplified for long division.* *Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.*	8528 ÷ 4 2 1 3 2 4 | 8 5¹2 8 **Sharing**  8 thousands shared into 4 equal groups 5 hundreds shared into 4 equal groups Regroup 1 hundred for 10 tens 12 tens shared into 4 equal groups 8 ones shared into 4 equal groups. **Grouping**  How many groups of 4 thousands in 8 thousands? How many groups of 4 hundreds in 5 hundreds? Regroup 1 hundred for 10 tens. How many groups of 4 tens in 12 tens? How many groups of 4 ones in 8 ones?

Strategies & Guidance	CPA
Long division **Dividing a 4-digit number by a 2-digit number** *Follow the language structures of the short division strategy. Instead of recording the regrouped amounts as small digits the numbers are written out below. This can be easier to work with when dividing by larger numbers.* *If dividing by a number outside of their known facts, pupils should start by recording some multiples of that number to scaffold.*	34 12 | 408 36 48 48 0 408 ÷ 12