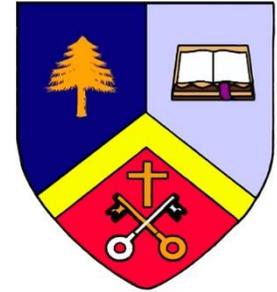# St Peter's C of E Junior School

Progression in Calculation Policy

KEY STAGE 2

In Years 3 and 4, children develop the basis of written methods by building their skills alongside a deep understanding of place value. They should use known addition/subtraction and multiplication/division facts to calculate efficiently and accurately, rather than relying on counting. Children use place value equipment to support their understanding, but not as a substitute for thinking.

Key language: partition, place value, tens, hundreds, thousands, column method, whole, part, equal groups, sharing, grouping, bar model

Addition and subtraction: In Year 3 especially, the column methods are built up gradually. Children will develop their understanding of how each stage of the calculation, including any exchanges, relates to place value. The example calculations chosen to introduce the stages of each method may often be more suited to a mental method. However, the examples and the progression of the steps have been chosen to help children develop their fluency in the process, alongside a deep understanding of the concepts and the numbers involved, so that they can apply these skills accurately and efficiently to later calculations. The class should be encouraged to compare mental and written methods for specific calculations, and children should be encouraged at every stage to make choices about which methods to apply.

In Year 4, the steps are shown without such fine detail, although children should continue to build their understanding with a secure basis in place value. In subtraction, children will need to develop their understanding of exchange as they may need to exchange across one or two columns.

By the end of Year 4, children should have developed fluency in column methods alongside a deep understanding, which will allow them to progress confidently in upper Key Stage 2.
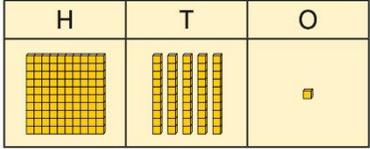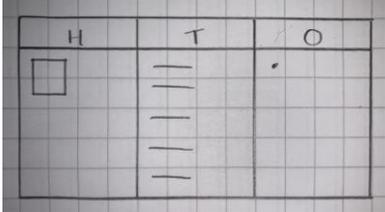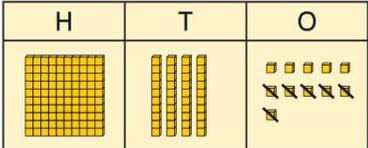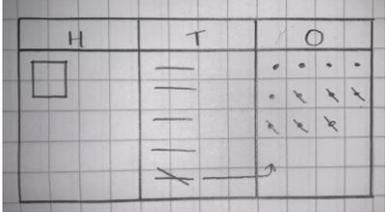
Multiplication and division: Children build a solid grounding in times-tables, understanding the multiplication and division facts in tandem. As such, they should be as confident knowing that 35 divided by 7 is 5 as knowing that 5 times 7 is 35. Children develop key skills to support multiplication methods: unitising, commutativity, and how to use partitioning effectively.

Unitising allows children to use known facts to multiply and divide multiples of 10 and 100 efficiently. Commutativity gives children flexibility in applying known facts to calculations and problem solving. An understanding of partitioning allows children to extend their skills to multiplying and dividing 2- and 3-digit numbers by a single digit.

Children develop column methods to support multiplications in these cases.

For successful division, children will need to make choices about how to partition. For example, to divide 423 by 3, it is effective to partition 423 into 300, 120 and 3, as these can be divided by 3 using known facts.

Children will also need to understand the concept of remainder, in terms of a given calculation and in terms of the context of the problem.

Fractions: Children develop the key concept of equivalent fractions, and link this with multiplying and dividing the numerators and denominators, as well as exploring the visual concept through fractions of shapes. Children learn how to find a fraction of an amount, and develop this with the aid of a bar model and other representations alongside.

in Year 3, children develop an understanding of how to add and subtract fractions with the same denominator and find complements to the whole. This is developed alongside an understanding of fractions as numbers, including fractions greater than 1. In Year 4, children begin to work with fractions greater than 1.

Decimals are introduced, as tenths in Year 3 and then as hundredths in Year 4. Children develop an understanding of decimals in terms of the relationship with fractions, with dividing by 10 and 100, and also with place value.
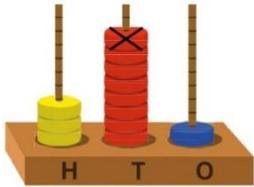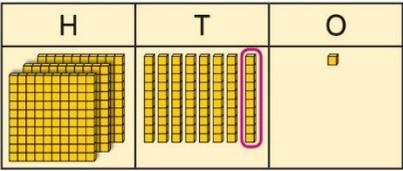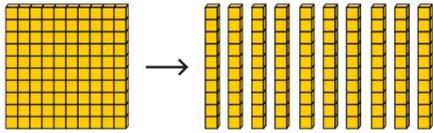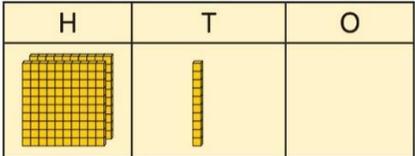
	Year 3 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
Subtracting 100s	Use known facts and unitising to subtract multiples of 100. *5 − 2 = 3* *500 − 200 = 300*	Use known facts and unitising to subtract multiples of 100. *4 − 2 = 2* *400 − 200 = 200*	Understand the link with counting back in 100s. *400 − 200 = 200* Use known facts and unitising as efficient and accurate methods. *I know that 7 − 4 = 3. Therefore, I know that 700 − 400 = 300.*
3-digit number − 1s, no exchange	Use number bonds to subtract the 1s. *214 − 3 = ?* *4 − 3 = 1* *214 − 3 = 211*	Use number bonds to subtract the 1s. *319 − 4 = ?* *9 − 4 = 5* *319 − 4 = 315*	Understand the link with counting back using a number line. Use known number bonds to calculate mentally. *476 − 4 = ?* *6 − 4 = 2* *476 − 4 = 472*

	Year 3 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
3-digit number – 1s, exchange or bridging required	Understand why an exchange is necessary by exploring why 1 ten must be exchanged. Use place value equipment.	Represent the required exchange on a place value grid. *151 − 6 = ?* 	Calculate mentally by using known bonds. *151 − 6 = ?* *151 − 1 − 5 = 145*

	Year 3 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
3-digit number − 10s, no exchange	Subtract the 10s using known bonds. *381 − 10 = ?* *8 tens with 1 removed is 7 tens.* *381 − 10 = 371*	Subtract the 10s using known bonds. *8 tens − 1 ten = 7 tens* *381 − 10 = 371*	Use known bonds to subtract the 10s mentally. *372 − 50 = ?* *70 − 50 = 20* *So, 372 − 50 = 322*
3-digit number − 10s, exchange or bridging required	Use equipment to understand the exchange of 1 hundred for 10 tens.	Represent the exchange on a place value grid using equipment. *210 − 20 = ?* *I need to exchange 1 hundred for 10 tens, to help subtract 2 tens.* *210 − 20 = 190*	Understand the link with counting back on a number line. Use flexible partitioning to support the calculation. *235 − 60 = ?* *235 = 100 + 130 + 5* *235 − 60 = 100 + 70 + 5* * = 175*
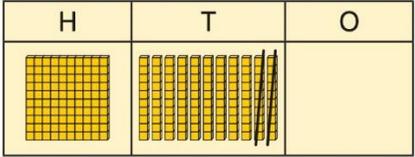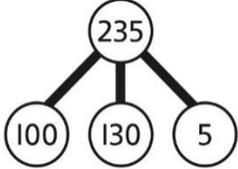
Year 3 – Subtraction			
	Concrete	**Pictorial**	**Abstract**
3-digit number – up to 3-digit number	Use place value equipment to explore the effect of splitting a whole into two parts, and understand the link with taking away.	Represent the calculation on a place value grid.	Use column subtraction to calculate accurately and efficiently.
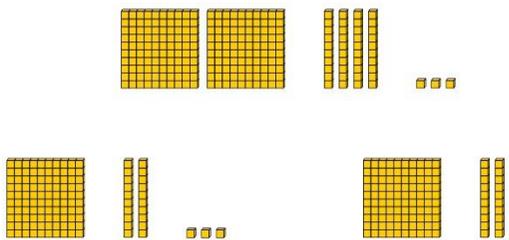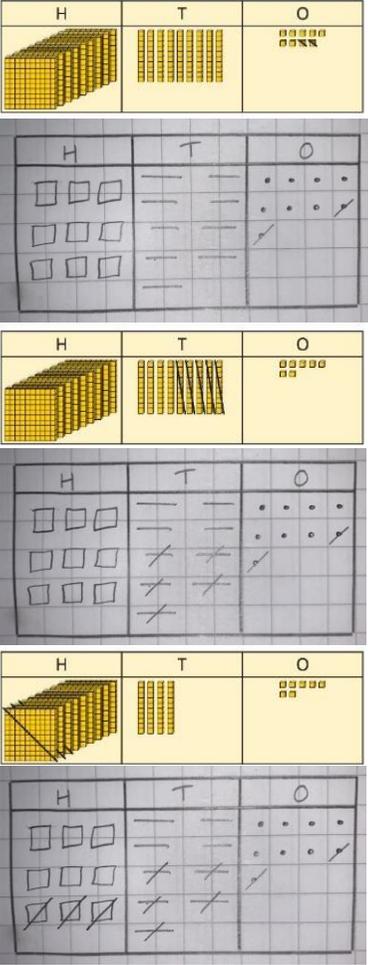
Year 3 – Subtraction			
	Concrete	**Pictorial**	**Abstract**
3-digit number – up to 3-digit number, exchange required	Use equipment to enact the exchange of 1 hundred for 10 tens, and 1 ten for 10 ones. 	*Model the required exchange on a place value grid.* *175 − 38 = ?* *I need to subtract 8 ones, so I will exchange a ten for 10 ones.* 	Use column subtraction to work accurately and efficiently. 175 − 38 = 137 If the subtraction is a 3-digit number subtract a 2-digit number, children should understand how the recording relates to the place value, and so how to line up the digits correctly. Children should also understand how to exchange in calculations where there is a zero in the 10s column.
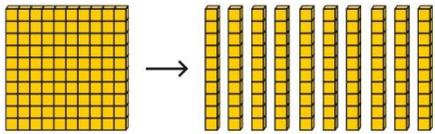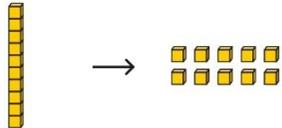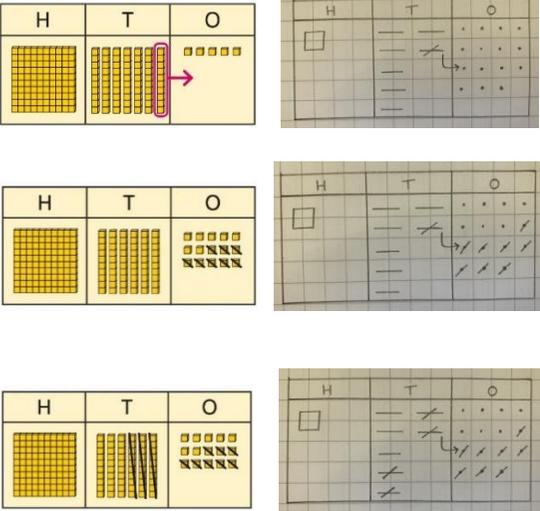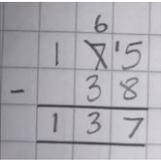
	Year 3 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
Representing subtraction problems		Use bar models to represent subtractions. 'Find the difference' is represented as two bars for comparison. Team A 454 Team B 128 ? Team A 4 5 4 Team B 128 ? Bar models can also be used to show that a part must be taken away from the whole.	Children use alternative representations to check calculations and choose efficient methods. Children use inverse operations to check additions and subtractions. The part-whole model supports understanding. *I have completed this subtraction.* *525 − 270 = 255* *I will check using addition.* 525 270 255 H T O 2 7 0 + 2 5 5 5 2 5
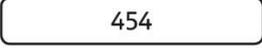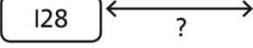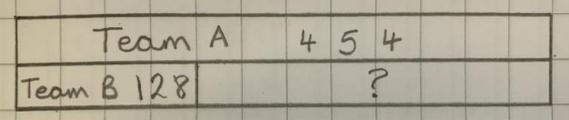
	Concrete	**Pictorial**	**Abstract**
Choosing mental methods where appropriate	Use place value equipment to justify mental methods. *What number will be left if we take away 300?*	Use place value grids to support mental methods where appropriate. *7,646 − 40 = 7,606*	Use knowledge of place value and unitising to subtract mentally where appropriate. *3,501 − 2,000* *3 thousands − 2 thousands = 1 thousand* *3,501 − 2,000 = 1,501*
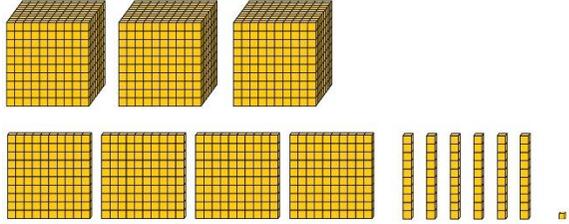
Year 4 – Subtraction

	Year 4 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
Column subtraction with exchange	Understand why exchange of a 1,000 for 100s, a 100 for 10s, or a 10 for 1s may be necessary.	Represent place value equipment on a place value grid to subtract, including exchanges where needed.	Use column subtraction, with understanding of the place value of any exchange required.
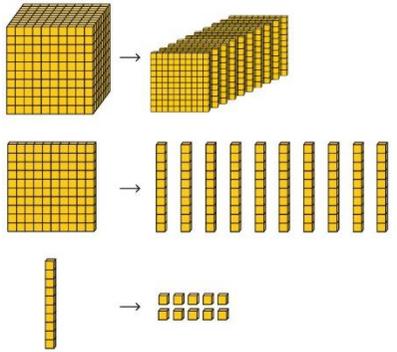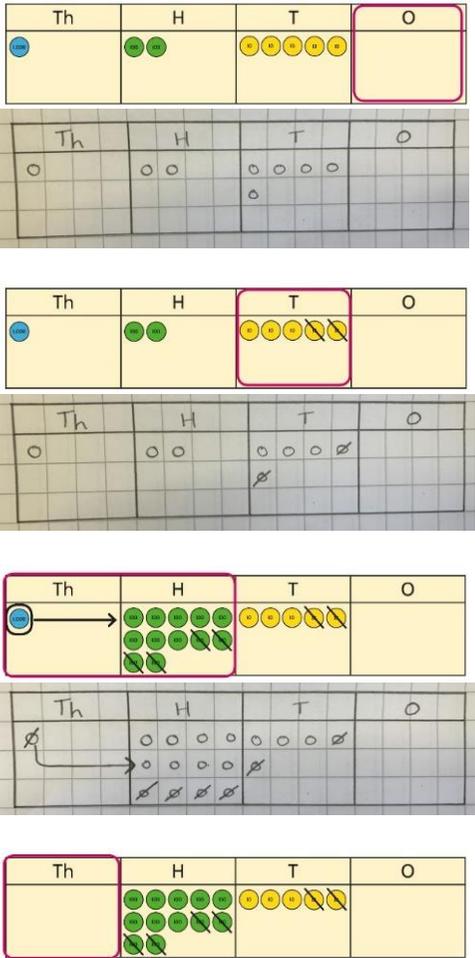
Year 4 – Subtraction
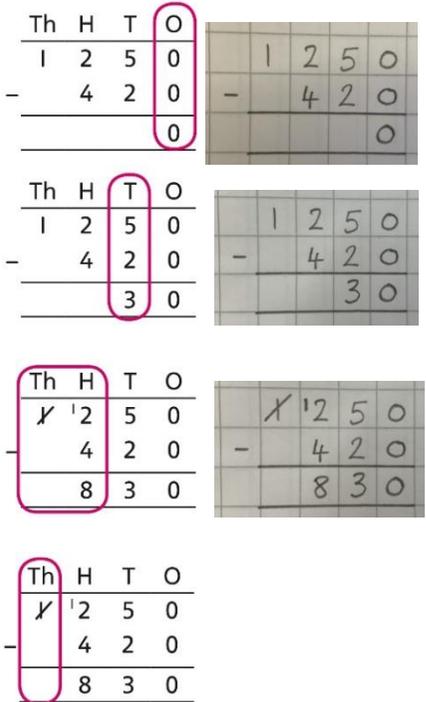
	Concrete	Pictorial	Abstract
Column subtraction with exchange across more than one column	Understand why two exchanges may be necessary. *2,502 − 243 = ?* *I need to exchange a 10 for some 1s, but there are not any 10s here.* 	Make exchanges across more than one column where there is a zero as a place holder. *2,502 − 243 = ?* 	Make exchanges across more than one column where there is a zero as a place holder. *2,502 − 243 = ?*
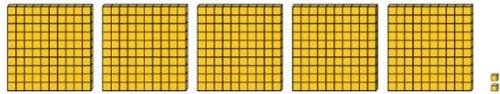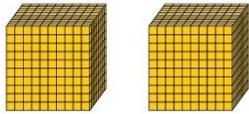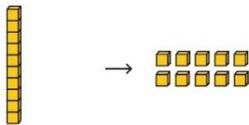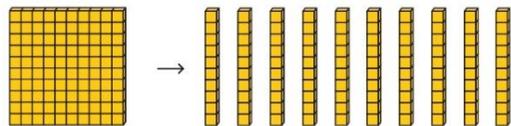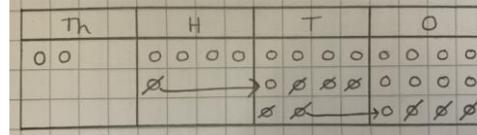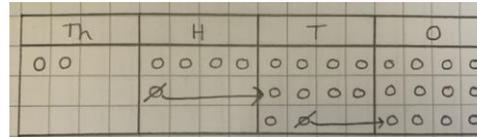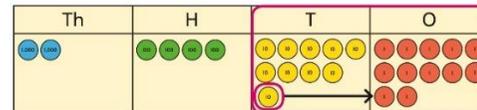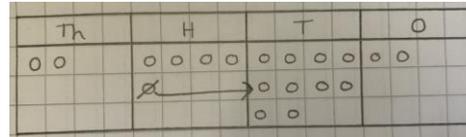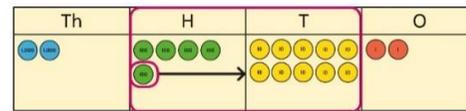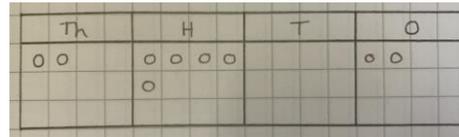
	Year 4 – Subtraction		
	Concrete	**Pictorial**	**Abstract**
Representing subtractions and checking strategies		Use bar models to represent subtractions where a part needs to be calculated. Total 5,762 ? | 2,899 Yes votes | No votes 5762 Yes = ? | No = 2899 *I can work out the total number of Yes votes using 5,762 − 2,899.* Bar models can also represent 'find the difference' as a subtraction problem. Danny 899 | ? Luis 1,005 Danny 899 | ? Luis 1005	Use inverse operations to check subtractions. *I calculated 1,225 − 799 = 574.* *I will check by adding the parts.* 1,225 799 | 574 Th H T O 7 9 9 + 5 7 4 1 3 7 3 7 9 9 + 5 7 4 1 3 7 1 *The parts do not add to make 1,225.* *I must have made a mistake.*

Year 5 – Subtraction				

	Concrete	Pictorial	Abstract
Column subtraction with whole numbers	Use place value equipment to understand where exchanges are required. *2,250 – 1,070*	Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required. *15,735 − 2,582 = 13,153* Now subtract the 10s. Exchange 1 hundred for 10 tens. Subtract the 100s, 1,000s and 10,000s. 	Use column subtraction methods with exchange where required. *62,097 − 18,534 = 43,563*
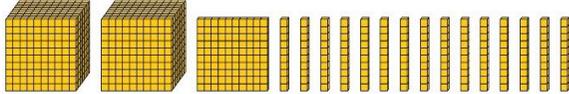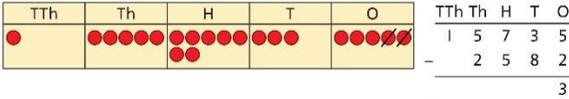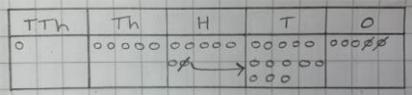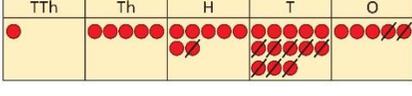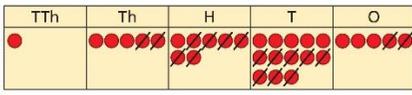
Checking strategies and representing subtractions		Bar models represent subtractions in problem contexts, including 'find the difference'.	Children can explain the mistake made when the columns have not been ordered correctly.
		Athletics Stadium — 75,450 Hockey Centre — ← 42,300 → Velodrome — 15,735 ← ? →	Bella's working / Correct method TTh Th H T O 1 7 8 7 7 + 4 0 1 2 5 7 9 9 7 TTh Th H T O 1 7 8 7 7 + 4 0 1 2 2 1 8 8 9 Use approximation to check calculations. *I calculated 18,000 + 4,000 mentally to check my subtraction.*
Choosing efficient methods			To subtract two large numbers that are close, children find the difference by counting on. *2,002 − 1,995 = ?* +5 +2 1,995 2,000 2,002 +5 +2 1995 2000 2002 Use addition to check subtractions. *I calculated 7,546 − 2,355 = 5,191.* *I will check using the inverse.*
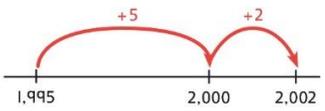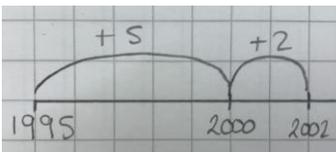
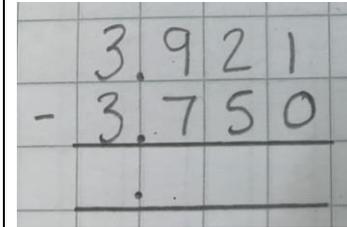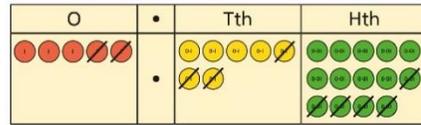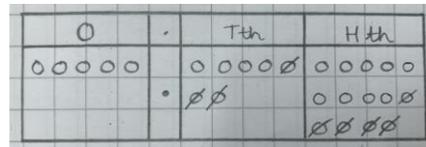| Subtracting decimals	Explore complements to a whole number by working in the context of length.	Use a place value grid to represent the stages of column subtraction, including exchanges where required.	Use column subtraction, with an understanding of place value, including subtracting numbers with different numbers of decimal places.
	0.49 m $1 \text{ m} - \boxed{} \text{ m} = \boxed{} \text{ m}$ *1 − 0.49 = ?*	*5.74 − 2.25 = ?* Exchange 1 tenth for 10 hundredths. Now subtract the 5 hundredths. 	*3.921 − 3.75 = ?* $$\begin{array}{r} \text{O} \cdot \text{Tth Hth Thth} \\ 3 \cdot 9 \; 2 \; 1 \\ - \; 3 \cdot 7 \; 5 \; 0 \\ \hline \cdot \end{array}$$
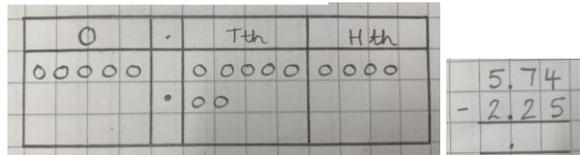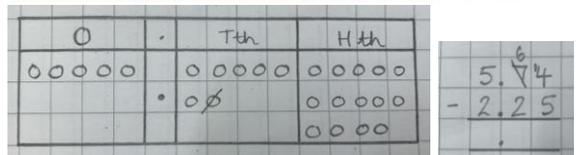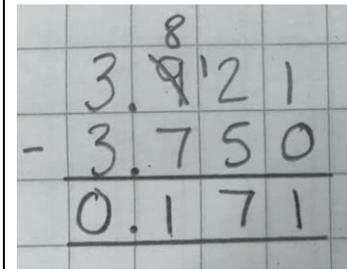
Now subtract the 2 tenths, then the 2 ones.

Year 6 – Subtraction

	Concrete	Pictorial	Abstract
Comparing and selecting efficient methods	Use counters on a place value grid to represent subtractions of larger numbers. 	Compare subtraction methods alongside place value representations. Use a bar model to represent calculations, including 'find the difference' with two bars as comparison. 	Compare and select methods. Use column subtraction when mental methods are not efficient. Use two different methods for one calculation as a checking strategy. Use column subtraction for decimal problems, including in the context of measure.
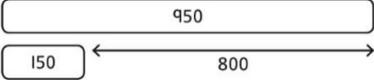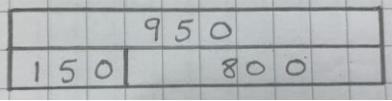
Subtracting mentally with larger numbers		Use a bar model to show how unitising can support mental calculations. *950,000 − 150,000* *That is 950 thousands − 150 thousands* *So, the difference is 800 thousands.* *950,000 − 150,000 = 800,000*	Subtract efficiently from powers of 10. *10,000 − 500 = ?*