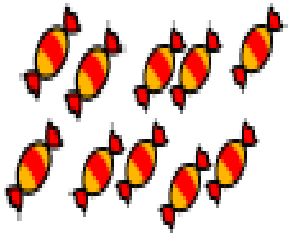
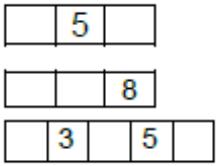
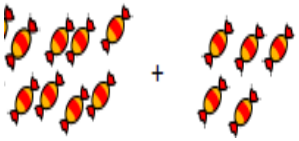
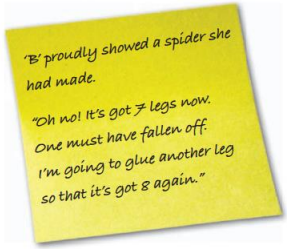
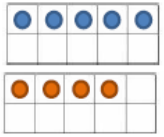
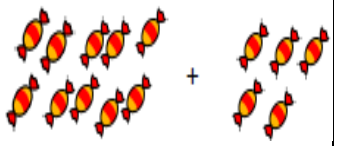
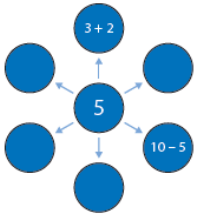
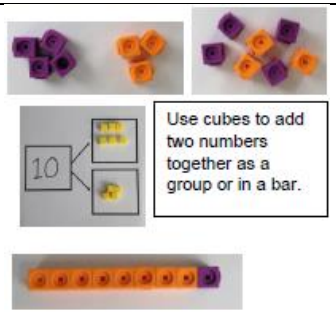
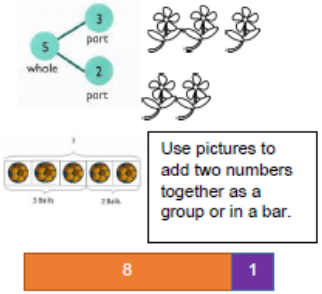
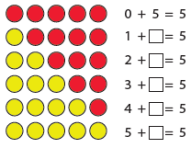
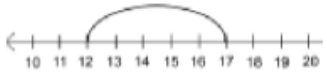
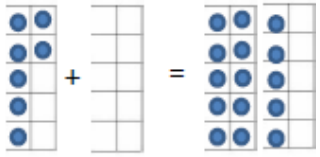
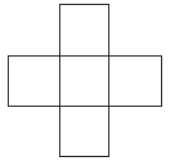
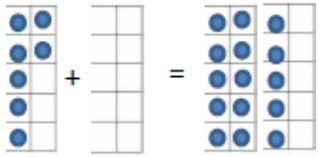
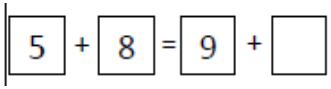
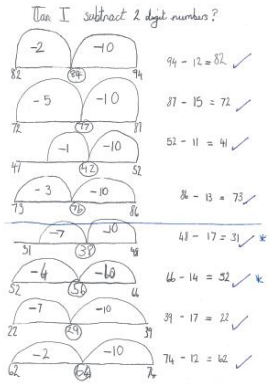
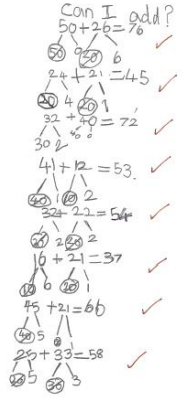
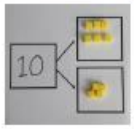
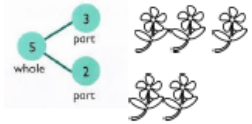
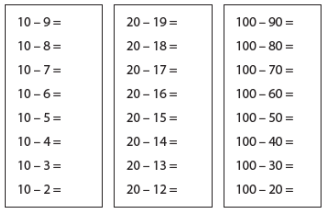
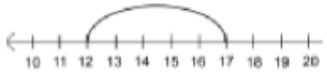
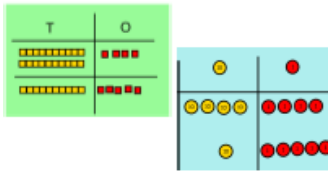
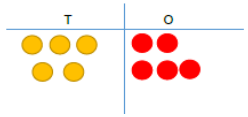
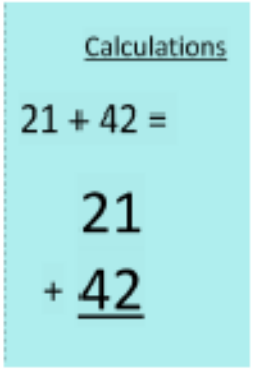
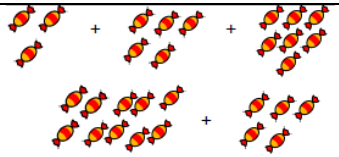
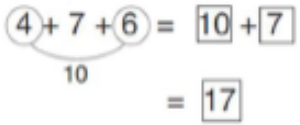
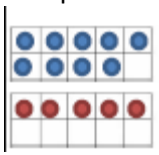
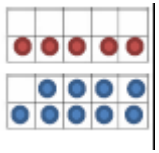
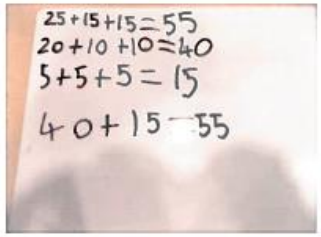
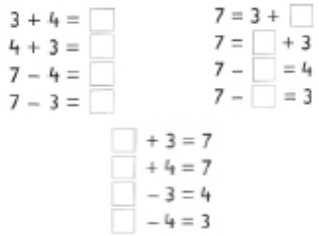
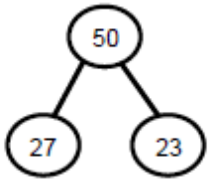
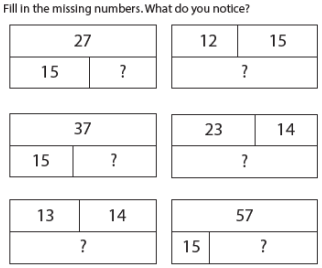
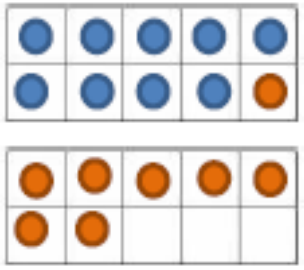
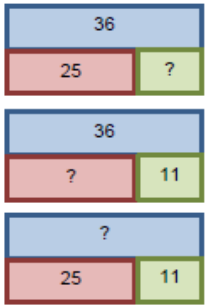
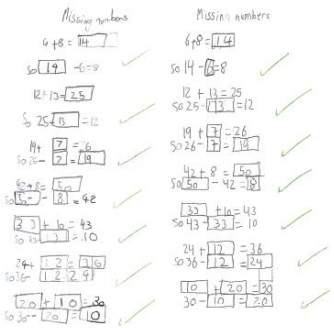
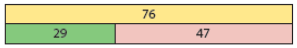
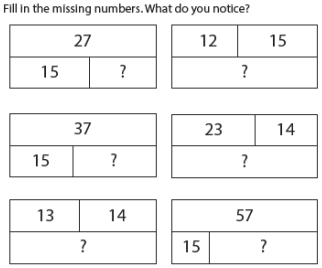
John Rankin School – Calculation Policy

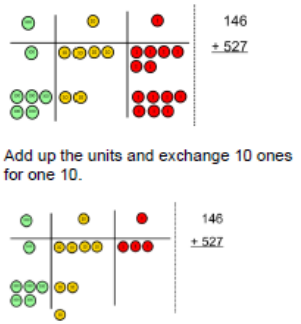
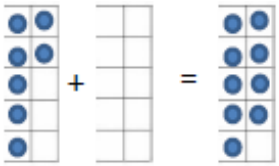
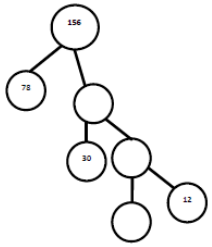
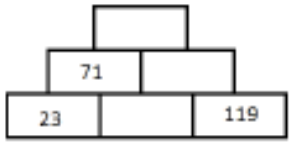
Addition						
		Concrete	Pictorial	Abstract	Mastery	Greater Depth
EYFS	Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number.			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20		A number line has been cut up. Can you find the missing numbers? 
	Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.			6+4=		Here are two ten frames.  Combine the numbers to find out how many there are altogether. Write a number sentence to show your working.
Year One	Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs.			Write a number sentence to describe the ten frame.	Robert has 5 more cherries than John. John has 11 cherries. How many does Robert have? Write a number sentence you would use to solve the problem. ☐ ☐ ☐ = ☐	If you know one fact, what other facts do you know? Complete: 

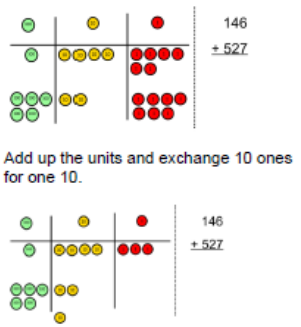
	Represent and use number bonds and related subtraction facts within 20.			4 + 3 = 7 10= 6 + 4 Use the part-part whole diagram as shown above to move into the abstract.	Use the pattern to complete the number sentences.  Children should be able to recall all number bonds to and within 10. Exposing the structure of the mathematics supports this process. They should then apply this to number bonds to 20, so if 5+3 = 8, 15 +3 = 18	Show children a price list with items costing up to 20p. I have 20p to spend. If I spend 20p exactly, which two items could I buy? And another two, and another two. If I bought one of the items how much change would I have? And another one, and another one.
	Add and subtract one-digit and two-digit numbers to 20, including zero.	 Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	 Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.	Complete: 3 + □ = 10 □ + 5 = 10 □ + □ = 10 13 + □ = 20 15 + □ = 20 16 + □ = 20	Write a pair of numbers in the boxes to add to 12. □ + □ = 12 And another pair, and another, and another. Can you find all possibilities? Convince me!
	Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such	Jim has 7 cubes. Amy has 3 cubes. How many cubes do they have altogether? 	Complete the missing number. 	James has two dice. He rolls them and scores 5 altogether. Which two numbers could he have rolled?	Captain Conjecture says, 'If you add 0 to a number, the number stays the same.' Do you agree? Explain your reasoning.	Write the numbers 1 to 5 in the squares so that each row and column adds up to the same number, called the 'magic number'. What is the 'magic number'? 

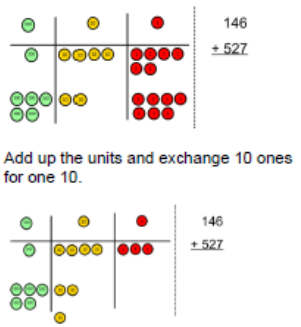
	as 7 = – 9.					
Year 2	Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures.	Jim has 7 cubes. Amy has 3 cubes. How many cubes do they have altogether? 	Complete the missing number. 	There are 5 people upstairs on the bus, there are 4 people downstairs. How many altogether? Write a number sentence to show this.	Dan needs 80 g of sugar for his recipe. There are 45 g left in the bag. How much more does he need to get? The temperature was 26 degrees in the morning and 11 degrees colder in the evening. What was the temperature in the evening? A tub contains 24 coins. Saj takes 5 coins. Joss takes 10 coins. How many coins are left in the tub?	Together Jack and Sam have £12. Jack has £2 more than Sam. How much money does Sam have?
	Solve problems with addition and subtraction applying their increasing knowledge of mental and written methods.	Use cubes to help you solve the problem.  			Captain Conjecture says, ‘An odd number + an odd number = an even number’. Is this sometimes, always or never true? Explain your reasoning.	Captain Conjecture says, ‘An odd number + an odd number + an odd number = an even number’. Is this sometimes, always or never true? Explain your reasoning.
	Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.	  Use cubes to add two numbers together as a group or in a bar. 	 Use pictures to add two numbers together as a group or in a bar. 	4 + 3 = 7 10= 6 + 4 Use the part-part whole diagram as shown above to move into the abstract.	What do you notice about each set of calculations? What’s the same and what’s different about the three sets of calculations?  	Complete the calculations. 30 + 40 + □ = 100 40 + □ + 20 = 100 36 + 44 + □ = 100 36 + 54 + □ = 100 47 + □ + 20 = 100 47 + □ + 30 = 100

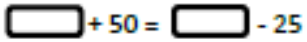
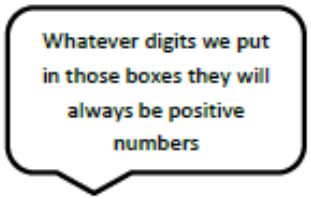
	Add and subtract numbers using concrete objects, pictorial representations, and mentally, • Including a two-digit number and ones. • Including a two-digit number and tens	 Start with the larger number on the bead string and then count on the smaller number 1 by 1.	 Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.	Fill in the missing numbers and explain what you notice. 23 + □ = 30 33 − □ = 30 43 + □ = 50 53 − 3 = □	Find different possibilities. □ + □ = 50 50 − □ = □
	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including two two-digit numbers	24+15= Add together the ones first and then add the tens. Use the Base 10 blocks first before moving onto place value counters. 	After practically using Base 10 blocks and place value counters, children can draw the counters to help them to solve addition. 		Fill in the missing numbers and explain what you notice. 23 + □ = 30 33 − □ = 30 43 + □ = 50 53 − 3 = □	Find different possibilities. □ + □ = 50 50 − □ = □
	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including adding	4+7+6=17 Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with 2 of the digits (if possible) then add	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder.	Fill in the missing numbers and explain what you notice. 23 + □ = 30 33 − □ = 30 43 + □ = 50 53 − 3 = □	Find different possibilities. □ + □ = 50 50 − □ = □

	three one-digit numbers	on the third digit.				
	Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.	Compare  and 	 	Complete the number sentences.  	How many number sentences can you write to describe the part whole model?  	
	Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	How many number sentences can you write to describe the ten frames? 	Write a number sentence to find the value of the ? in each of the bar models.  		Pupils use the bar model to explore addition and subtraction facts and the relationship between them.  Using the bar model complete he four number sentences. □ + □ = □ + □ = □ − □ = □ − □ =	

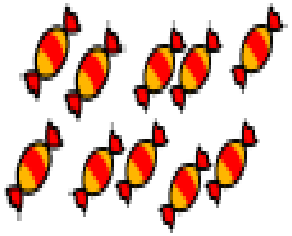
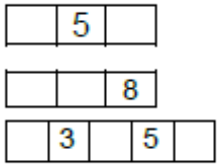
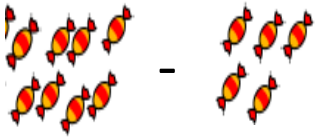
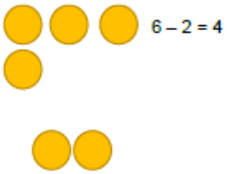
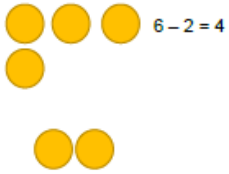
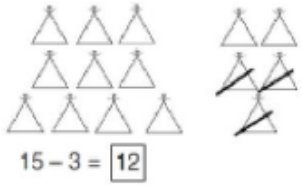
Year 3	Add and subtract numbers mentally, • Including a three-digit number and ones. • Including a three-digit number and tens. • Including a three-digit number and hundreds.		Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	Start by partitioning the numbers before moving on. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1	Complete these calculations. What do you notice? 3 + 7 = 8 + 2 = 6 + 4 = 30 + 70 = 80 + 20 = 60 + 40 = 33 + 7 = 88 + 2 = 66 + 4 = 333 + 7 = 888 + 2 = 666 + 4 = 300 + 700 = 800 + 200 = 600 + 400 =	Throw a 1 to 6 dice and each time record the digit in one of the place holders. The aim is to get the sum as low as possible. Repeat to find different answers. Could you have done it in a different way? Compete against a friend and compare your answers. ☐☐☐ + ☐☐☐ =
	Estimate the answer to a calculation and use inverse operations to check answers.		Which of these has the wrong answer? A: 740 - 300 = 440 B: 240 + 310 = 550 C: 199 + 199 = 399 D: 501 + 501 = 1002	Make an estimate: Which of the following number sentences have an answer between 50 and 60? 274 - 219 533 – 476 132 - 71	Colin says. 'If I add two numbers together I can check my answer by using a subtraction of the same numbers afterwards. So to check 3 + 4, I can do 4 -3.' Is he always right? Explain why.	Is it magic? Think of a number. Multiply it by 5. Double it. Add 2. Subtract 2. Halve it. Divide it by 5. Have you got back to your original number? Is this magic? Can you work out what has happened? Explain to a friend.
	Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	Find and make the missing number. 	Complete the part whole diagram. 		Using coins, find three ways to make £1.	Sophie has five coins in her pocket. How much money might she have? What is the greatest amount she can have? What is the least amount she can have? If all the coins are different: What is the greatest amount she can have? What is the least amount she can have?

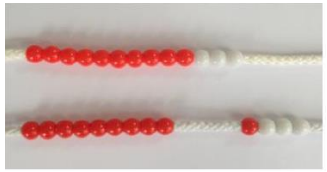
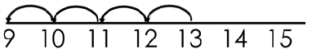
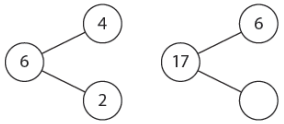
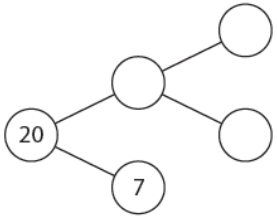
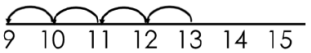
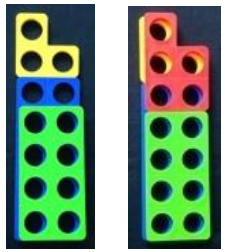
Year 4	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.		Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	Start by partitioning the numbers before moving on. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1	Write down the four relationships you can see in the bar model. 2300 | 1240 3540 □ + □ = □ □ + □ = □ □ − □ = □ □ − □ = □	Identify the missing numbers in these bar models. They are not drawn to scale. 1000 | □ | 353 | 354 2000 | 493 | □ | 754 Select your own numbers to make this bar model correct. 5000 | □ | □ | □
	Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.			Hazel fills in this bar model. 2821 | 2178 | □ She makes the following calculations from it. 2,821 – 2,178 = 757 2,821 – 757 = 2,178 2,178 + 757 = 2,821 757 + 2,178 = 2,821 Is she correct? Explain why.	With a friend, discuss before working each out which will be greater or smaller than the other. Why do you think this? What key facts did you use? 3,567 – 567 ○ 3,677 – 344 4,738 + 36 ○ 4,738 + 18 + 18 2,139 – 85 + 27 ○ 2,151 – 86 + 30	

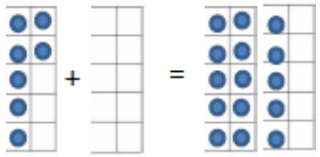
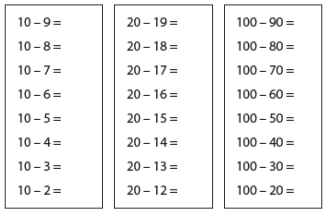
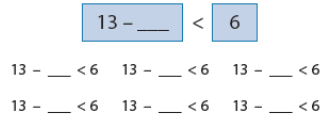
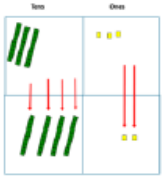
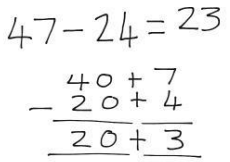
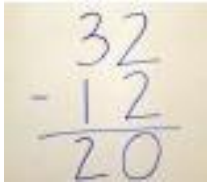
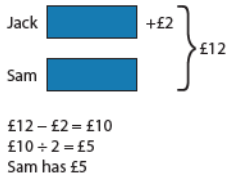
Year 5	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)		Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	Start by partitioning the numbers before moving on. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1	Set out and solve these calculations using a column method. 3254 + ☐ = 7999 2431 = ☐ – 3456 6373 – ☐ = 3581 6719 = ☐ – 4562	True or False? 3999 – 2999 = 4000 – 3000 3999 – 2999 = 3000 – 2000 2741 – 1263 = 2742 – 1264 2741 + 1263 = 2742 + 1264 2741 – 1263 = 2731 – 1253 2741 – 1263 = 2742 – 1252 Explain your reasoning.
	Add and subtract numbers mentally with increasingly large numbers.			Work out this missing numbers: ☐ - 92 = 145 740 + ☐ = 1,039 ☐ = 580 – 401	If 2,541 is the answer, what's the question? - Can you create three addition calculations? - Can you create three subtraction calculations? - Did you use a strategy?	Use this number sentence to write down three more pairs of decimal numbers that sum to 3: 1·6 + 1·4 = 3
	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.			A car showroom reduces the price of a car from £18,750 to £14,999. By how much was the price of the car reduced? Circle the most sensible answer £3,249 £4,001 £3,751	Captain Conjecture says, 'When working with whole numbers, if you add two 2-digit numbers together the answer cannot be a 4-digit number.' Do you agree? Explain your reasoning.	Captain Conjecture says, 'If you keep subtracting 3 from 397 you will eventually reach 0.' Do you agree? Explain your reasoning.
	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.		122 + ☐ + 57 = 327	Beth and Mabel share £410 between them. Beth received £100 more than Mabel. How much did Mabel receive?	The table shows the cost of train tickets from different cities. What is the total cost for a return journey to York for one adult and two children? How much more does it cost for two adults to make a single journey to Hull than to Leeds? Adult Single £13·50 £16·60 £11·00 Return £24·50 £30·00 £20·00 Child Single £9·75 £11·00 £8·00 Return £15·00 £18·50 £13·50	Sam and Tom have £67·80 between them. If Sam has £6·20 more than Tom, how much does Tom have?

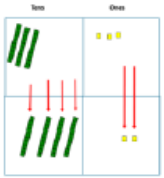
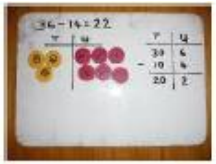
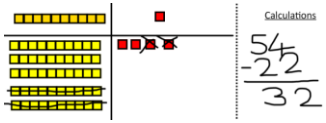
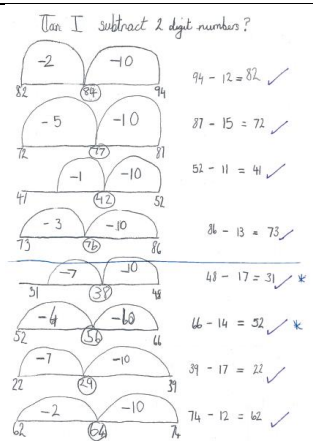
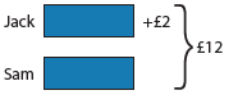
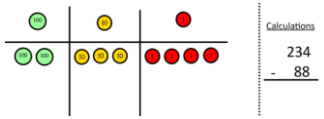
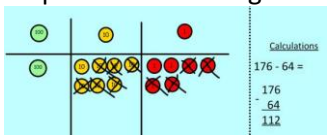
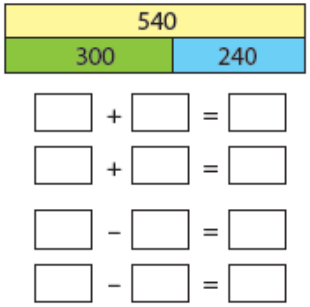
Year 6	Perform mental calculations, including with mixed operations and large numbers.			The following problem was given to the class.  Shellie says  Do you agree? Explain your reason.	Calculate 36·2 + 19·8 with a formal written column method with a mental method, explaining your reasoning.	Jasmine and Kamal have been asked to work out 5748 + 893 and 5748 – 893. Jasmine says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the addition by adding on 1000 and then taking away 100 and then taking away 7.' What answer does Jasmine get, and is she correct? Kamal says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the subtraction by taking away 1000 and then taking away 100 and then taking away 7.' What answer does Kamal get, and is he correct? If you disagree with either Jasmine or Kamal, can you correct their reasoning?
	Use their knowledge of the order of operations to carry out calculations involving the four operations.				Compare 31 + 9 × 7 and (31 + 9) × 7 What's the same? What's different?	Write different number sentences using the digits 2, 3, 5 and 8 before the equals sign, using: • one operation • two operations but no brackets • two operations and brackets. Can you write a number sentence using the digits 2, 3, 5 and 8 before the equals sign, which has the same answer as another number sentence using the digits 2, 3, 5 and 8 but which is a different sentence?

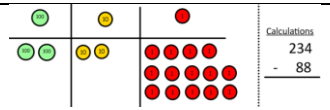
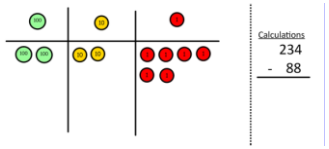
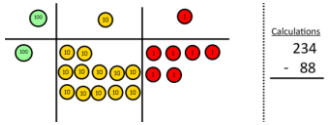
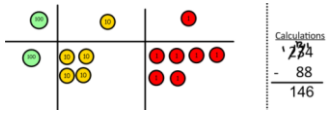
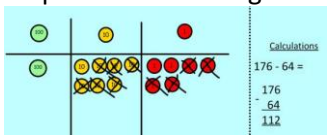
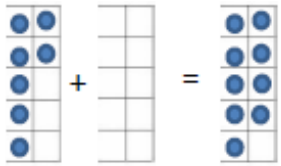
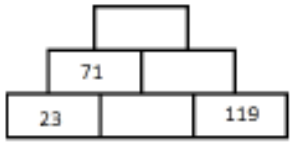
	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.				Two numbers have a difference of 2·38 . The smaller number is 3·12 . What is the bigger number? Two numbers have a difference of 2·3 . They are both less than 10. What could the numbers be?	Two numbers have a difference of 2·38 . What could the numbers be if: • the two numbers add up to 6? • one of the numbers is three times as big as the other number? Two numbers have a difference of 2·3 . To the nearest 10, they are both 10. What could the numbers be?

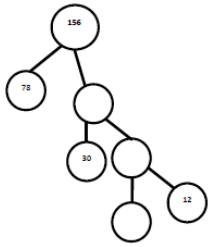
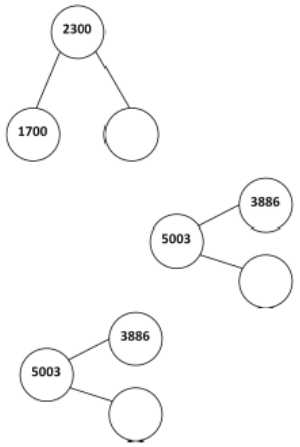
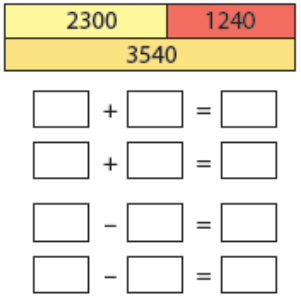
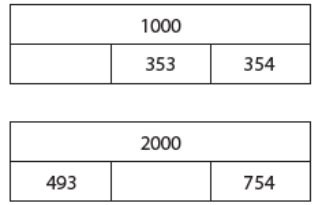
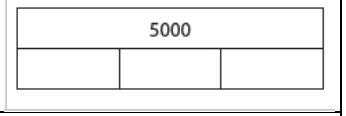
Subtraction						
		Concrete	Pictorial	Abstract	Mastery	Greater Depth
EYFS	Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number.			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20		A number line has been cut up. Can you find the missing numbers? 
	Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.			7-2=		Use physical objects, counters, cubes etc. to show how objects can be taken away. 
Year One	Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs.	Use physical objects, counters, cubes etc. to show how objects can be taken away. 	Cross out drawn objects to show what has been taken away. 	18 -3= 15 8 – 2 = 6	Robert has 5 more cherries than John. John has 11 cherries. How many does Robert have? Write a number sentence you would use to solve the problem. ☐ ☐ ☐ = ☐	Together Sam and Tom have 19 football stickers. Tom has 8 stickers. How many stickers does Sam have? Write a number sentence you could use to solve the problem.

	Add and subtract one-digit and two-digit numbers to 20, including zero.	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4  Use counters and move them away from the group as you take them away counting backwards as you go. 	Count back on a number line or number track.  Start at the bigger number and count back the smaller number showing the jumps on the number line.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.		
	Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = – 9.	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4 Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track.  Start at the bigger number and count back the smaller number showing the jumps on the number line.	Difference between 13 and 8 13 – 8 = _ 8 + _ = 13 	Complete: 3 + □ = 10 10 – □ = 3 □ + 5 = 10 10 – 5 = □ □ + □ = 10 10 – □ = □ 13 + □ = 20 20 – □ = 13 15 + □ = 20 20 – □ = 15 16 + □ = 20 20 – □ = 16 What do you notice?	I'm thinking of a number. I've subtracted 5 and the answer is 7. What number was I thinking of? Explain how you know.

Year 2	Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures.	Jim has 7 cubes. Amy has 3 cubes. How many cubes do they have altogether? 	Complete the missing number. 	Lily has 3 dogs. Dog A and B weigh 7kg. Dog B and C weigh 8kg. Dog A and C weigh 11kg. What does each dog weigh?	What do you notice about each set of calculations? What's the same and what's different about the three sets of calculations?  10 – 9 = 10 – 8 = 10 – 7 = 10 – 6 = 10 – 5 = 10 – 4 = 10 – 3 = 10 – 2 = 20 – 19 = 20 – 18 = 20 – 17 = 20 – 16 = 20 – 15 = 20 – 14 = 20 – 13 = 20 – 12 = 100 – 90 = 100 – 80 = 100 – 70 = 100 – 60 = 100 – 50 = 100 – 40 = 100 – 30 = 100 – 20 =	Insert numbers to make these number sentences correct.  13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6
	Solve problems with addition and subtraction applying their increasing knowledge of mental and written methods.	Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first. 	Draw the Base 10 or place value counters alongside the written calculation to help to show working. 	This will lead to a clear written column subtraction.  	Dan needs 80 g of sugar for his recipe. There are 45 g left in the bag. How much more does he need to get? The temperature was 26 degrees in the morning and 11 degrees colder in the evening. What was the temperature in the evening? A tub contains 24 coins. Saj takes 5 coins. Joss takes 10 coins. How many coins are left in the tub?	Together Jack and Sam have £12. Jack has £2 more than Sam. How much money does Sam have? (A bar model can be very helpful in solving these types of problems.)  Jack +£2 £12 Sam £12 – £2 = £10 £10 ÷ 2 = £5 Sam has £5

	Add and subtract numbers using concrete objects, pictorial representations, and mentally, • Including a two-digit number and ones. • Including a two-digit number and tens • Including two two-digit numbers • Including adding three one-digit numbers	Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first. 	Draw the Base 10 or place value counters alongside the written calculation to help to show working.  	 	Dan needs 80 g of sugar for his recipe. There are 45 g left in the bag. How much more does he need to get? The temperature was 26 degrees in the morning and 11 degrees colder in the evening. What was the temperature in the evening? A tub contains 24 coins. Saj takes 5 coins. Joss takes 10 coins. How many coins are left in the tub?	Together Jack and Sam have £12. Jack has £2 more than Sam. How much money does Sam have? (A bar model can be very helpful in solving these types of problems.)  £12 – £2 = £10 £10 ÷ 2 = £5 Sam has £5
Year 3	Add and subtract numbers mentally, • Including a three-digit number and ones. • Including a three-digit number and tens. • Including a	Make the larger number with the place value counters. Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.  	Draw the Base 10 or place value counters alongside the written calculation to help to show working.  	Children can start their formal written method by partitioning the number into clear place value columns. Moving forward the children use a more compact method. 	Write the four number facts that this bar model shows.  	Flo and Jim are answering a problem: Danny has read 62 pages of the class book, Jack has read 43. How many more pages has Danny read than Jack? Flo does the calculation 62 + 43. Jim does the calculation 62–43. Who is correct? Explain how you know. (Pupils might demonstrate using a bar model to explain their reasoning.)

	three-digit number and hundreds.	 Now I can subtract my ones.				
	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.	 Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.  Now I can take away eight tens and complete my subtraction.  Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.	Draw the Base 10 or place value counters alongside the written calculation to help to show working. 	Children can start their formal written method by partitioning the number into clear place value columns. Moving forward the children use a more compact method. This will lead to an understanding of subtracting any number including decimals. 5 12 1 2 6 3 . 0 - 2 6 . 5 2 3 6 . 5	Solve calculations using a place value grid and equipment alongside a column method to demonstrate understanding.	Sophie has five coins in her pocket. How much money might she have? What is the greatest amount she can have? What is the least amount she can have? If all the coins are different: What is the greatest amount she can have? What is the least amount she can have?
	Solve problems, including missing number problems, using number facts, place value, and more complex addition and	Find and make the missing number. 	Complete the part whole diagram.		Using coins, find three ways to make £1.	Sophie has five coins in her pocket. How much money might she have? What is the greatest amount she can have? What is the least amount she can have? If all the coins are different: What is the greatest amount she can have?

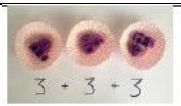
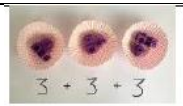
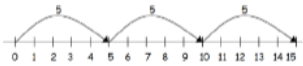
	subtraction.					What is the least amount she can have?
Year 4	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.		Complete the part-whole Models 	6177 - 1728 6118 - 1225 3335 - 1104 2958 - 1462	Write down the four relationships you can see in the bar model. 	Identify the missing numbers in these bar models. They are not drawn to scale.  Select your own numbers to make this bar model correct. 
Year 5	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)				Set out and solve these calculations using a column method. 3254 + ☐ = 7999 2431 = ☐ – 3456 6373 – ☐ = 3581 6719 = ☐ – 4562	True or False? 3999 – 2999 = 4000 – 3000 3999 – 2999 = 3000 – 2000 2741 – 1263 = 2742 – 1264 2741 + 1263 = 2742 + 1264 2741 – 1263 = 2731 – 1253 2741 – 1263 = 2742 – 1252 Explain your reasoning. Using this number statement, 5222 – 3111 = 5223 – 3112 write three more pairs of equivalent calculations. (Pupils should not calculate the answer to these questions but should look at the

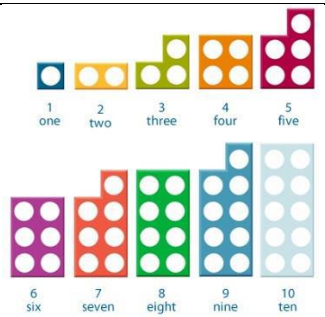
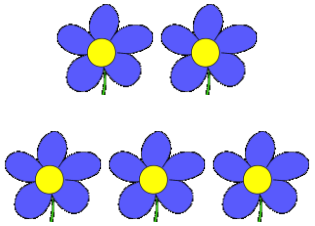
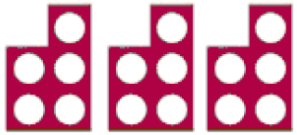
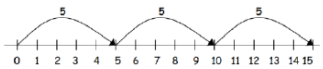
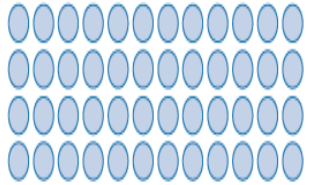
						structure and relationships between the numbers.)
	Add and subtract numbers mentally with increasingly large numbers.				Children follow a series of instructions to find a mystery number. Eg Start with 100 Add 5,000 Take away 400 Add 20 Subtract 750 What number have you got?	
	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.		$122 + \square + 57 = 327$	Beth and Mabel share £410 between them. Beth received £100 more than Mabel. How much did Mabel receive?	The table shows the cost of train tickets from different cities. What is the total cost for a return journey to York for one adult and two children? How much more does it cost for two adults to make a single journey to Hull than to Leeds? 	Sam and Tom have £67·80 between them. If Sam has £6·20 more than Tom, how much does Tom have?
Year 6	Perform mental calculations, including with mixed operations and large numbers.				Calculate 36·2 + 19·8 with a formal written column method with a mental method, explaining your reasoning.	Jasmine and Kamal have been asked to work out 5748 + 893 and 5748 – 893. Jasmine says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the addition by adding on 1000 and then taking away 100 and then

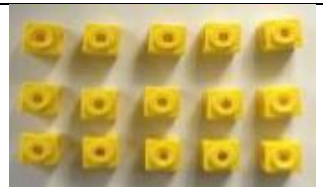
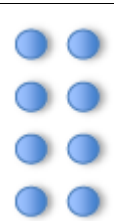
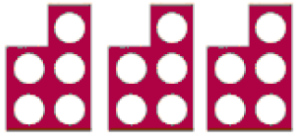
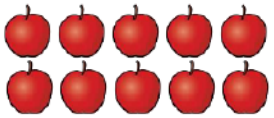
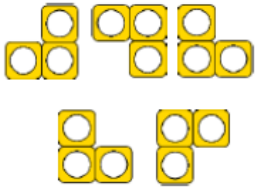
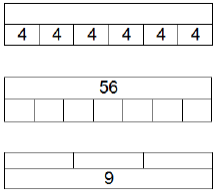
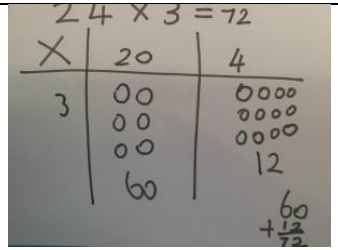
		York	Hull	Leeds
Adult	Single	£13·50	£16·60	£11·00
	Return	£24·50	£30·00	£20·00
Child	Single	£9·75	£11·00	£8·00
	Return	£15·00	£18·50	£13·50

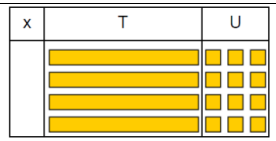
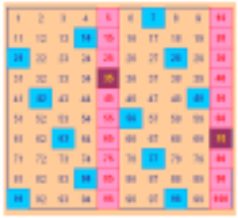
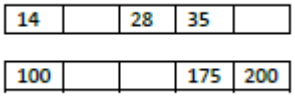
						taking away 7.' What answer does Jasmine get, and is she correct? Kamal says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the subtraction by taking away 1000 and then taking away 100 and then taking away 7.' What answer does Kamal get, and is he correct? If you disagree with either Jasmine or Kamal, can you correct their reasoning?
	Use their knowledge of the order of operations to carry out calculations involving the four operations.				Compare $31 + 9 \times 7$ and $(31 + 9) \times 7$ What's the same? What's different?	Write different number sentences using the digits 2, 3, 5 and 8 before the equals sign, using: • one operation • two operations but no brackets • two operations and brackets. Can you write a number sentence using the digits 2, 3, 5 and 8 before the equals sign, which has the same answer as another number sentence using the digits 2, 3, 5 and 8 but which is a different sentence?
	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.				Two numbers have a difference of 2·38 . The smaller number is 3·12 . What is the bigger number? Two numbers have a difference of 2·3 . They are both less than 10. What could the numbers	Two numbers have a difference of 2·38 . What could the numbers be if: • the two numbers add up to 6? • one of the numbers is three times as big as the other number? Two numbers have a difference of 2·3 . To the nearest 10, they are both 10.

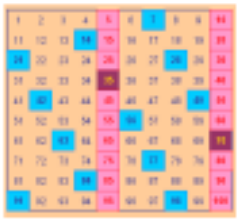
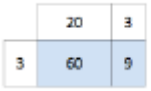
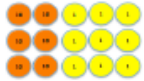
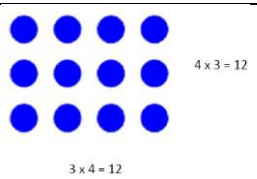
					be?	What could the numbers be?

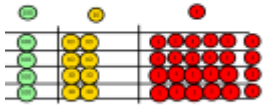
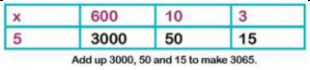
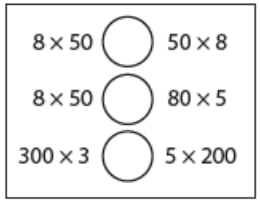
Multiplication						
		Concrete	Pictorial	Abstract	Mastery	Greater Depth
EYFS	Solve problems, including doubling, halving and sharing.	C put two wheels on one side of his lorry. Now double it. He put two on the other side. That's four."	Jean-Luca 6/3/14 "If you roll a 3 and a 3 you get a double and you can roll the dice again." when playing a game.	Kaci chose to buy 2 Lego bricks at 3p each. She used her fingers to add 3+3 and said "that's six"	He is at the writing table with his peers. They are talking about their hands. 'I have 10 fingers look.' He holds up his hands. 'What's 10 and 10?... I think it's 20.' He tells his peer. 'And 3 and 3 is 6.'	 Use different objects to add equal groups.
Year One	Count in multiples of twos, fives and tens	Count in multiples supported by concrete objects in equal groups.	Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30	Show pupils pictures or groups of objects. Ask questions such as 'How many biscuits are there altogether?' Observe how pupils count the objects. Do they count in twos, fives etc. or do they count in ones?	If I start on 0 and count on in fives will I say the number 55? If I start on 4 and count on in twos will I say the number 17? If I start at 10 and count on in tens will I say 100?
	Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	 Use different objects to add equal groups.	2 add 2 add 2 equals 6  5+5+5=15	Write addition sentences to describe objects and pictures.	Ali buys 3 bags of apples. Each bag has 4 apples in it. How many apples does he buy?	Lollies cost 5p each. A pack of 3 lollies costs 13p. How much money do you save when you buy a pack of 3 lollies instead of 3 single lollies?
Year Two	Recall and use multiplication	Look at Numicon up to 10	A flower has 5 petals. How many petals do 5	Circle the odd numbers.	Complete and compare the 5 and 10 times tables.	True or false? $5 \times 4 = 4 \times 5$

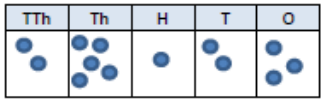
	and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	 Which numbers are odd? Which are even? What's the same about the even numbers? What's the same about the odd numbers?	flowers have? 	12 13 17 18 21	What do you notice? 5 × 1 = 10 × 1 = 5 × 2 = 10 × 2 = 5 × 3 = 10 × 3 = 5 × 4 = 10 × 4 =	5 × 4 = 10 × 2 5 × 4 = 2 × 10 Explain your reasoning. What do you notice?
	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.	5x3= 	5x3= 	5x3=	What is 5 × 4? What is 10 × 6? (Being able to answer such questions is, of course, important, but check pupils understand the meaning of them. For example, ask them to make 5 x 4 and 10 x 6 using concrete apparatus.)	Write these addition sentences as multiplication sentences. 10 + 10 + 10 + 5 + 5 = 2 + 2 + 2 + 4 = 2 + 2 + 4 + 4 = 5 + 5 + 5 + 2 + 3=
	Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.		Draw arrays 2 x 4 = 8	Use an array to write multiplication sentences. 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15	**Show me...** ... how you can represent 10 x 4 in as many ways as possible **Convince me...** ... that multiplication is commutative **What's the same? What's different?** 5 10ps, 10 5ps, 10 x 5, 5 x 10, 5 lots of 10, 10 lots of 5 **Always, sometimes, never**	Find different ways to find the answer to 12 × 4. 

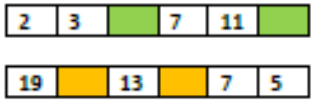
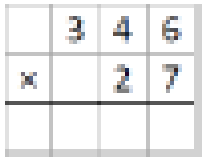
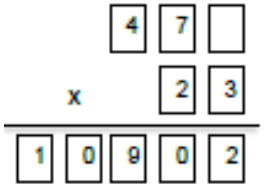
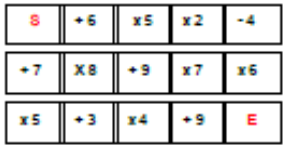
			 4 x 2 = 8		... you get the same answer whichever way round you multiply	
	Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	 5x3=	Use the pictures to fill in the missing numbers. groups of =	10x2=	Here are some apples.  Class 2 are asked work out the total. Here are four different ways they do it. Fill in the missing blanks. ..... + ... = 10 ..... + ... + ... + ... + ... = 10 ..... × ..... = 10 ..... × ..... = 10	Which has the most biscuits: 4 packets of biscuits with 5 in each packet, or 3 packets of biscuits with 10 in each packet? Explain your reasoning.
Year Three	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	How many altogether? 	Complete the bar models. 	Show me 8 groups of 4. Tell me what division and multiplication facts you can find from this.	What is 3 × 4? What is 13 × 4? (Asking 'How did you get that?' can help you decide whether children are working efficiently with questions like 13 × 4 by, for example, calculating 10 × 4 and adding 3 × 4, and that 3 × 4 is not obtained by counting in 1s.)	Make up a problem for 13 × 4 and solve it.
	Write and calculate mathematical statements for multiplication and division using the	Use Base 10 to move towards a more compact method. 13x4=		13x8=	What is the relationship between these calculations? 3 × 4 4 × 8 4 × 3 8 × 4	What is the relationship between these calculations? 2 × 3 4 × 3 2 × 30 4 × 30 20 × 3 40 × 3 20 × 3 × 10 40 × 3 × 10

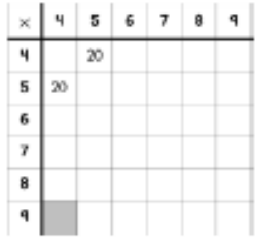
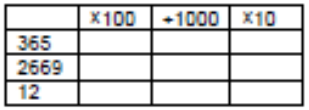
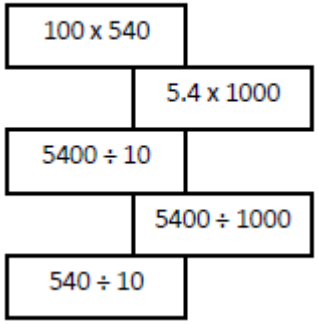
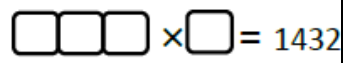
	multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.					(Children should use their knowledge of place value to mentally calculate by multiples of 10.)
	Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.			Kainat is making buns. For every 40g of flour she needs 1 egg. If she uses 5 eggs, how many grams of flour does she use? If she uses 400g of flour, how many eggs does she need?	Complete the following: $3 \times \square = 12$ $4 \times \square = 20$ $\square \times 3 = 15$ $8 \times \square = 24$	Putting the digits 1, 2 and 3 in the empty boxes, how many different calculations can you make $\square\,\square \times \square = ?$ Which one gives the largest answer? Which one gives the smallest answer?
Year Four	Count in multiples of 6, 7, 9, 25 and 1000.			**Find the next two numbers** **6, 12, 18, 24,** **7, 14, 21, 28, 35,** **9, 18, 27, 36** **25, 50, 75,** **5000, 6000, 7000**	Gemma counts on in 25s from 50. Circle the numbers that she will say: 990 550 125 755 150	Here is a sequence of numbers: 20, 30, 40, 50 What will the nineteenth number in the sequence be? What will the hundredth number in the sequence be?

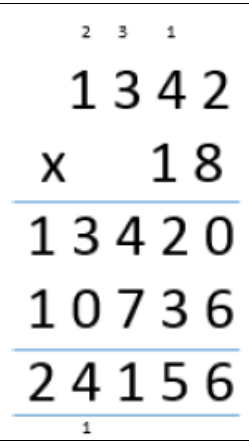
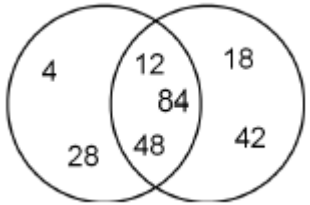
	Recall multiplication and division facts for multiplication tables up to 12 × 12.			Complete these calculations: 7 x 8= 7 x 4 x 2= 5 x 6 = 5 x 3 x 2= 12 x 4 = 12 x 2 x 2=	What do you notice about the following calculations? Can you use one calculation to work out the answer to other calculations? 2 × 3 = 6 × 7 = 9 × 8 = 2 × 30 = 6 × 70 = 9 × 80 = 2 × 300 = 6 × 700 = 9 × 800 = 20 × 3 = 60 × 7 = 90 × 8 = 200 × 3 = 600 × 7 = 900 × 8 =	Multiply a number by itself and then make one factor one more and the other one less. What happens to the product? E.g. 4 × 4 = 16 6 × 6 = 36 5 × 3 = 15 7 × 5 = 35 What do you notice? Will this always happen?
	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.	Building arrays using place value counters 	Generalising the array using a grid (a 	Fill in the missing numbers: □ x 1 = 13 12 x 0 = □ 3 x 2 x □ = 18	Always, sometimes, never An even number that is divisible by 3 is also divisible by 6.	Try to reach the target number below by multiplying three of the numbers together. Cross out any numbers you don't use. Target number: 144 1 5 3 0 6 8
	Recognise and use factor pairs and commutativity in mental calculations.	Building arrays using place value counters 		Show me ... a factor pair that makes 18 ... two factor pairs that make 20	Multiply a number by itself and then make one factor one more and the other one less. What do you notice? Does this always happen? Eg 4 x 4 = 16 6 x 6= 36 5 x 3 = 15 7 x 5= 35	The school has a singing group of more than 12 singers but less than 32. They sing together in different ways. Sometimes they sing in pairs and sometimes in groups of 3, 4 or 6. Whatever size groups they are in, no one is left out and everyone is singing.

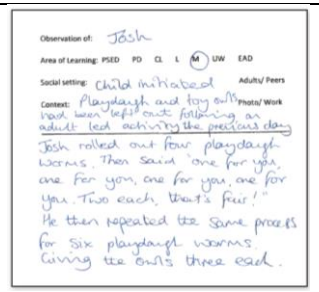
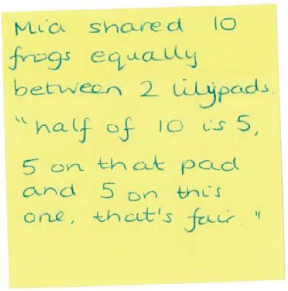
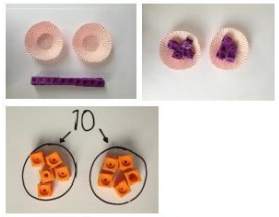
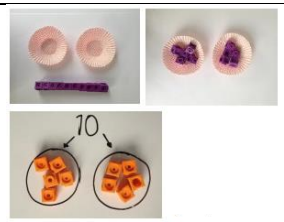
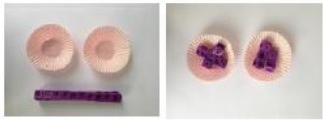
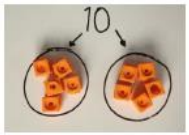
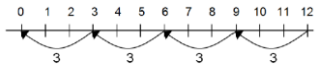
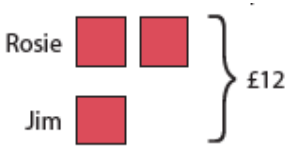
						How many singers are there in the school choir?
	Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.	Use counters to solve 126 x 4 Draw 4 rows and make 126 in each of them.  Add up the columns and exchange counters where needed to find the answer.	 	4 6 3 x 8 3 7 0 4 5 2	Harry buys 6 chocolate bars, one chocolate bar costs 54p. How much does Harry spend? a) Write a number sentence to represent the problem. b) Solve the problem.	Place one of these symbols in the circ >, < or =. Explain your reasoning. 
	Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.			Harry buys 6 chocolate bars, one chocolate bar costs 54p. How much does Harry spend? a) Write a number sentence to represent the problem. b) Solve the problem.	Jenny needs to buy 20 cupcakes for a p A shop has two offers on cupcakes. 5 cupcakes for 40p 4 cupcakes for 30p Which offer is better? How much money will Jenny spend altogether? 	An ice cream sundae is made from one scoop of ice cream, one topping and one sauce. How many different ice cream sundaes can be created from 5 different flavours of ice cream, 3 different toppings and 4 different sauces?

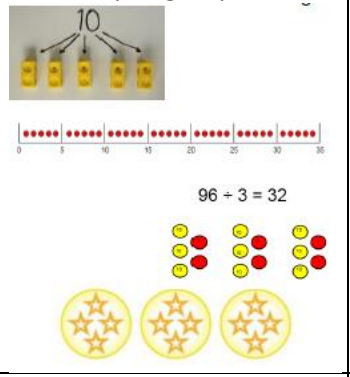
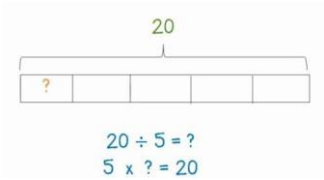
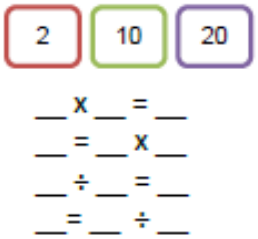
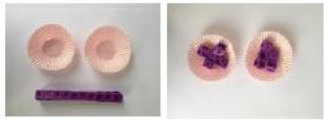
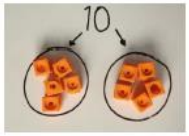
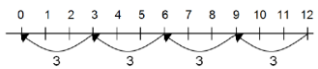
Year Five	Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000.			Finish the sequence: 1000, 2000, 3000, ____, _____ 350, 340, ____, _____, _____ 11800, 11900, _____, _____	Count forwards in 100s from these starting numbers. What are the third and fifth numbers you say? 345 7,621 32 12,742 352,600	Jenny counts forward and backwards in 10s from 317. Which numbers could Jenny count as she does this? 427 997 507 1,666 3,210 5,627 -23 7 -3
	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.			8 is a multiple of 4 and a factor of 16 6 is a multiple of 3 and a factor of ☐ ☐ is a multiple of 5 and a factor of ☐ ☐ is a multiple of ☐ and a factor of ☐	Tom says; Factors come in pairs, so all numbers have an even number of factors. Do you agree? Explain your reasoning. True or False The bigger the number, the more factors it has.	Sally is thinking of a number. She says My number is a multiple of 3. It is also 3 less than a multiple of 4. Find three different numbers that could be Sally's number.
	Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.			• Find the missing prime factors. 12 → 2, ☐, 3 18 → 2, ☐, 3	Katie says, All prime numbers have to be odd. Do you agree? Convince me. Her friend, Abdul, says, That means 9, 27 and 45 are prime numbers. Explain Abdul's mistake and correct it.	How many square numbers can you make by either adding two prime numbers together or by subtracting one prime number from another e.g. 11 - 7 = 4 Prime numbers Square number

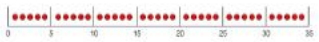
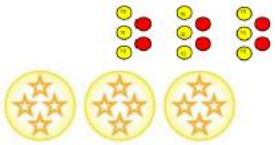
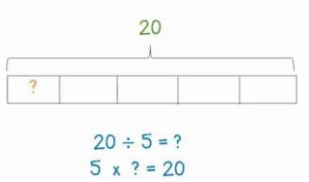
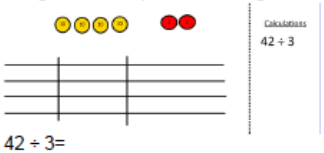
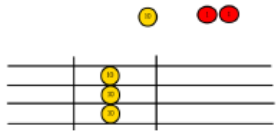
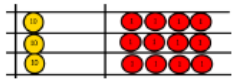
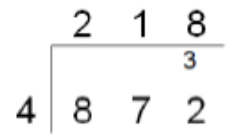
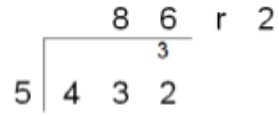
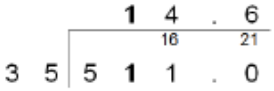
	Establish whether a number up to 100 is prime and recall prime numbers up to 19.			Find all the prime numbers between 60 and 80.  	Fill in the missing numbers so that the calculation creates a prime number. 19 – ☐ = ☐ Is this the only option?	Prime factors are the prime numbers that multiply together to make a number e.g. Is it possible to make every number by multiplying prime numbers together?
	Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers			 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768	Spot the mistake and make a correction. 527 x 42 10540 2018 12648 Laura thinks that a 4 should be placed in the empty box. Do you agree?  	Start with 0; choose a path through the maze. Which path has the highest/ lowe total? You can go up, down, left or right. 

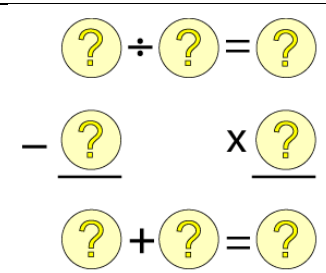
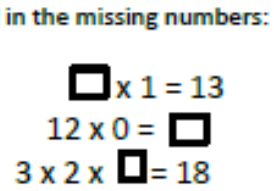
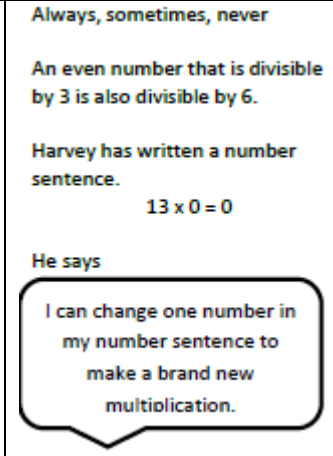
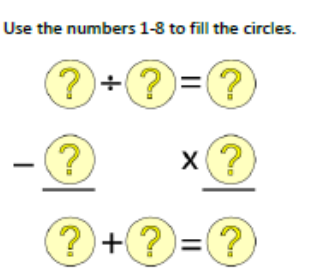
	Multiply and divide numbers mentally drawing upon known facts.			Find the answer: 2 x 11 = 4 x 11 = 2 x 12 = 4 x 12 = 2 x 13 = 4 x 13 =	To multiply a number by 25 you multiply by 100 and then divide by 4. Use this strategy to solve. 84 x 25 28 x 25 5.6 x 25	If 8 x 24 = 192, how many other pairs numbers can you write that have the product of 192? Here is part of a multiplication grid. 
	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.				True or false? When you multiply whole and decimal numbers by 10, 100 or 1000, you just add noughts on to the end. If 5 x 4 = 20 Explain why these facts are true without working them out: 0.5 x 4 = 2 200 ÷ 4 = 50 0.4 x 0.5 = 0.2	• Put these calculations in order from smallest to biggest: 
Year Six	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.			3,678 × 23 2,678 × 230 1,598 × 46 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768	Work out the missing numbe Explain how you know. 80 × _____= 560000 What other facts do you kno from this?	• Can you complete the following calculation to create 1432?  What is the closest answer you can make? How do you know it is the closest?

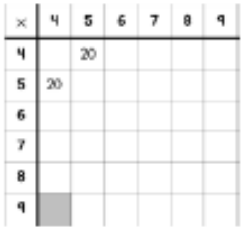
						
	Perform mental calculations, including with mixed operations and large numbers.			Work out the missing numbers 5,419 + 2,000 = 9,836 - ☐ 200 × ☐ = 750 + ☐	The following problem was given to class. ☐ + 50 = ☐ - 25 Shellie says Whatever digits we put in those boxes they will always be positive numbers Do you agree? Explain your reason.	Peter paid £21 for 5 presents. For A and B he paid a total of £6. For B and C he paid a total of £10. For C and D he paid a total of £7. For D and E he paid a total of £9. How much did Peter pay for each present?
	Identify common factors, common multiples and prime numbers				Stefi says The only prime number between 30 and 40 is 37	Tahil has £32 He shares the money evenly between his friends. He has more than 1 friend. How many friends could Tahil have?

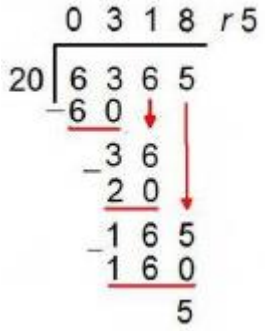
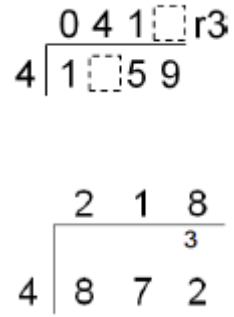
Division						
		Concrete	Pictorial	Abstract	Mastery	Greater Depth
EYFS	Solve problems, including doubling, halving and sharing.	 Observation of: Josh Area of Learning: PSED PD CL L M UW EAD Social setting: Child initiated Adults/ Peers Context: Playdough and toy cutters had been left out following an adult led activity the previous day. Josh rolled out four playdough worms. Then said 'one for you, one for you, one for you, one for you. Two each, that's four!' He then repeated the same process for six playdough worms, giving the snails three each.	 Mia shared 10 frogs equally between 2 lilypads. "half of 10 is 5, 5 on that pad and 5 on this one, that's four."	A story made up as he works on the computer. This is Thomas and his friends. They are going to the shops. They are going to buy chocolate. They are going to share the chocolate. There are 5 pieces, it is an odd number so they can't share it equally so they will eat one piece in half.	A story made up as he works on the computer. This is Thomas and his friends. They are going to the shops. They are going to buy chocolate. They are going to share the chocolate. There are 5 pieces, it is an odd number so they can't share it equally so they will eat one piece in half.	 I have 10 cubes, can you share them equally in 2 groups?
Year One	Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	 I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities. 8 ÷ 2 = 4	Share 9 buns between three people. 9 ÷ 3 = 3	Sarah is filling party bags with sweets. She has 20 sweets altogether and decides to put 5 in every bag. How many bags can she fill?	How else could 20 sweets be put into bags so that every bag had the same number of sweets? How many bags would be packed each time?
Year Two	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=)	I have 10 cubes, can you share them equally in 2 groups?  	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?	Two friends share 12 sweets equally between them. How many do they each get? Write this as a division number sentence. Make up two more sharing stories like this one.	Together Rosie and Jim have £12. Rosie has twice as much as Jim. How much does Jim have?  (The bar model can be helpful in

	signs.	Divide quantities into equal groups. 	how many would be within each group. 			solving these types of problems.)
	Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.			Here are some number cards. Use them to fill in each number sentence below. 	Circle the incorrect number sentence. Explain your reasons. 4 x 5 = 20 5 x 4 = 20 20 ÷ 5 = 4 5 ÷ 20 = 4	
	Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in	I have 10 cubes, can you share them equally in 2 groups?   Divide quantities into	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.	33÷3=	Cassie has 4 bags with 5 sweets in each. Rachel has 5 bags with 4 sweets in each. How many do they have each? Can you split the sweets into different numbers of bags so they both still have the same number?	Two friends want to buy some marbles and then share them out equally between them. They could buy a bag of 13 marbles, a bag of 14 marbles or a bag of 19 marbles. What size bag should they buy so that they can share them equally?

	contexts.	equal groups.  96 ÷ 3 = 32 	 				What other numbers of marbles could be shared equally? Explain your reasoning.
Year Three	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.	 Use place value counters to divide using the bus stop method alongside  42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.  We exchange this ten for ten ones and then share the ones equally among the groups.  We look how much in 1 group so the answer is 14.	(Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups. Encourage them to move towards counting in multiples to divide more efficiently.)	Begin with divisions that divide equally with no remainder.  Move onto divisions with a remainder.  Finally move into decimal places to divide the total accurately.  	The following problems can be solved by using the calculation 8 ÷ 2. True or false? There are 2 bags of bread rolls that have 8 rolls in each bag. How many rolls are there altogether? A boat holds 2 people. How many boats are needed for 8 people? I have 8 pencils and give 2 pencils to each person. How many people receive pencils? I have 8 pencils and give 2 away. How many do I have left?	Sam is planting onions in the vegetable plot in his garden. He arranges the onions into rows of 4 and has two left over. He then arranges them into rows of 3 and has none left over. How many onions might he have had? Explain your reasoning.
	Solve problems, including missing number problems, involving			12 buns are shared between 3 boys. 16 buns are shared between 4 girls. Who gets more buns, boys or girls?	Use the numbers 1 - 8 to fill the circles below:	

	multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.			Explain your answer.		
Year Four	Recall multiplication and division facts for multiplication tables up to 12 × 12.			Fill in the gaps: 4 x __ = 12 8 x __ = 64 32 = 4 x __ 6 = 24 ÷ __	Leila has 6 bags with 5 apples in each. How many apples does she have altogether? How many multiplication and division sentences can you write that have the number 72 in them?	I am thinking of 2 secret numbers where the sum of the numbers is 16 and the product is 48. What are my secret numbers? Can you make up 2 secret numbers and tell somebody what the sum and product are?
	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.					

Year Five	Multiply and divide numbers mentally drawing upon known facts.				To multiply a number by 25 you multiply by 100 and then divide by 4. Use this strategy to solve. 84 x 25 28 x 25 5.6 x 25	Here is part of a multiplication grid.  Shade in any other squares that have t same answer as the shaded square.
	Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.			68 ÷ 4 = 1248 ÷ 3 = 2 1 8 3 4 8 7 2	What number goes in the box? 323 x □1 = 13243 Prove it. Correct the errors in the calculation below. Explain the error. 266 ÷ 5 = 73.1 7 3 r 1 5 2 $^{3}6$ $^{1}6$	The answer to the division has no remainders. Find the missing numbers. 8 □ 2 7 5 8 9 □ I am thinking of a number. When it is divided by 9, the remainder is 3. When it is divided by 2, the remainder is 1. When it is divided by 5, the remainder is 4. What is my number?
	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.			Solve: 345 x 10 = 345 x 100 =	6 x 7 = 42 How can you use this fact to solve following calculations? 4,200 ÷ 70 = 0.6 x 0.7 =	David has £35,700 in his bank. He divides the amount by 100 and takes t much money out of the bank. Using the money he has taken out he spe £268 on furniture for his new house. How much money does David have left fr the money he took out? Show your working.

Year Six	Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.			1,455 ÷14 1,910 ÷ 18 725 ÷ 12 	Harry says Without doing a written method, I know 7,350 ÷ 7 will not have a remainder Is he correct? Convince me.	Using the number 4,236 how many numbers up to 20 does it divide by without a remainder? Is there a pattern?
	Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context				Here is a calculation 186 ÷ 4 = Adnan thinks that the answer is 46r2 Chad thinks that the answer is 46.2 Are they both correct? Explain your answer.	To divide a number by 18 you can use the following rule: Divide the number by 3 then divide that answer by 6 Try it for 387 ÷ 18 Can you create any similar rules for other numbers?

<table>
<tr>
<td></td>
<td>Perform mental calculations, including with mixed operations and large numbers.</td>
<td></td>
<td>Here is part of a multiplication grid.
<table>
<tr><th>×</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th></tr>
<tr><td>4</td><td></td><td>20</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>20</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Shade in any square that has the same answer as the shaded square.</td>
<td>5,419 + 2,000 = 9,836 - ☐
200 × ☐ = 750 + ☐</td>
<td>The following problem was given to the class.
☐ + 50 = ☐ - 25
Shellie says
Whatever digits we put in those boxes they will always be positive numbers
Do you agree? Explain your reason.</td>
<td>Peter paid £21 for 5 presents.
For A and B he paid a total of £6.
For B and C he paid a total of £10.
For C and D he paid a total of £7.
For D and E he paid a total of £9.
How much did Peter pay for each present?
</td>
</tr>
<tr>
<td></td>
<td>Use their knowledge of the order of operations to carry out calculations involving the four operations</td>
<td></td>
<td></td>
<td>3 + 4 x 7
6 + (25 x 9) – 1
10 – 32
20 + 15 ÷ 5
100 – 17 x 4</td>
<td>Daniel completed the following calculation and got the answer 168
2(30 ÷ 5) + 14 = 168
Can you explain what he did and where he made the mistake?</td>
<td>The mass of a box of chocolates is 290g.
The box contains 7 identical chocolates.

Manish eats 3 chocolates.
The mass of the box is now 194g
Find the weight of them empty box.</td>
</tr>
</table>