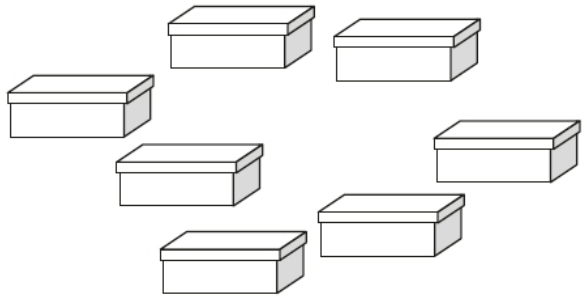
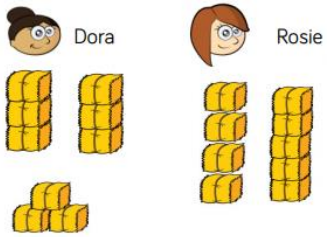
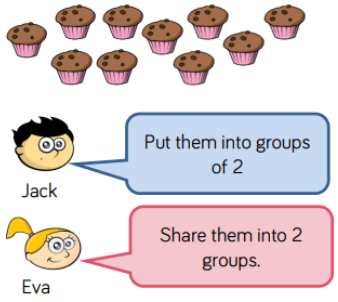
Area of Maths = Multiplication + Division

Multiplication	**Definition:** Multiplication is the process of repeatedly adding a number to itself. An array is a set of objects in rows and columns.	**Vocabulary:** Multiplication, times, lots of, multiples, multiply, groups of, factors, product, repeated addition, array.	**Structure:** **Whole numbers:** factor x factor = product **Decimals / fractions:** multiplicand x multiplier = product
Division	**Definition:** Division is sharing an amount of things or a number into equal parts / groups.	**Vocabulary:** Division, share, put into (equal) groups, divide, dividend, divisor, quotient, array.	**Structure:** **KS1:** Number / amount being shared ÷ number of groups = number in each group **KS2:** Dividend ÷ Divisor = Quotient

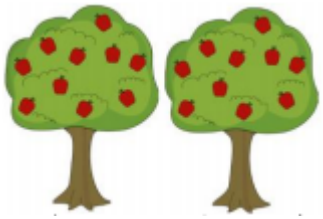
Declarative knowledge	**Reception**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Addition + Subtraction Automatically recall… **Blue highlight = Roche's Specific Expectations** **Red font = Roche's Priorities for Revisiting**	Double facts up to double 5 = 10	Double facts up to 20 Recall multiplication facts for the 10 times table, expressed as 'lots of 10' – TTRS in Summer 2	**Times table facts (including division facts) for the 10, 2 and 5 times table.** Multiplication is commutative but division is not.	**Times table facts (including division facts) for the 10, 2, 5, 3, 4 and 8 times table.** Associated fact multiplications, making one factor 10 times bigger e.g. 4 x 3 = 12 so 4 x 30 = 120	**Times table facts (including division facts) for tables up to 12 x 12.** Associated fact multiplications and divisions, making one factor either 10 or 100 times bigger e.g. 4 x 3 = 12 so 4 x 30 = 120 and 4 x 300 = 1,200 12 ÷ 3 =4 so 120 ÷ 3 = 40 and 1,200 ÷ 3 = 400	**Times table facts (including division facts) for tables up to 12 x 12.** Associated fact multiplications and divisions, making the factors a combination of 10, 100, 1,000 or 10,000 times bigger e.g. 4 x 3 = 12 so 4 x 30 = 120, 4 x 300 = 1,200, 4 x 3,000 = 12,000 4 x 3 = 12 so 40 x 30 = 1,200, 40 x 300 = 12,000, 400 x 30 = 12,000 and 4,000 x 30 = 120,000 12 ÷ 3 =4 so 120 ÷ 3 = 40 and 1,200 ÷ 3 = 400 Prime numbers to 19 Powers of 10 as 10^2 and 10^3 (100 = 10^2, 1,000 = 10^3)	Same as Year 5 plus: Correct order of operations (BODMAS)

Year 1						
Year group:	**NC L.O.**	**Practical**	**Pictorial**	**Abstract**	**Problem Solving**	**Reasoning**
		Make it! **SAY IT**	**Show it/Draw it!** **SAY IT**	**Read/Write it!** **SAY IT**		

1	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.	Counters Objects Hoops, cups or plates for sharing into. Numicon Unifix Money – 2p, 5p, 10p Dienes (tens) Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign	 Sita puts 2 shoes in each of these boxes. How many shoes are there altogether?  A shopkeeper has 20 fish and 5 fish bowls. He puts the same number of fish in each bowl. How many fish go in each bowl? How many birds are there altogether?  There are _____ birds in each tree. There are _____ trees. There are _____ birds altogether.	 Sam says: You would need 28 crayons to fill all three boxes. Is Sam correct? Explain why / why not. Sarah has 6 boxes of 5 crayons. Would this be enough to fill the three boxes above? Dora and Rosie are making hay bundles. Who has made equal groups?  I am thinking of a number between 20 and 30. I can only make equal groups of 5 What must my number be? What happens when I try to make groups of 2 with it?

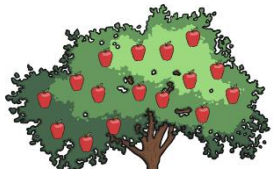
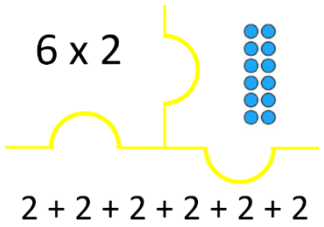
					Tommy and Jack each have the same number of sweets. Tommy has 5 equal groups of 2 Jack has 1 equal group. How many sweets are in Jack's group? Share the muffins equally between the two plates.  Complete the sentence. ___ cakes shared equally between 2 is ___	What happens when I try to make groups of 10 with it? There are 10 cakes and 2 boxes. An equal amount needs to be put into each box.  Who is correct? Explain your answer.

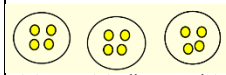
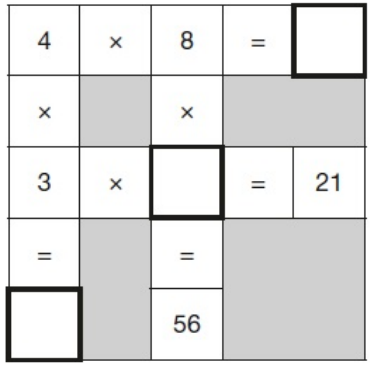
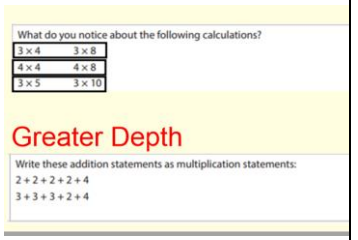
Year 2

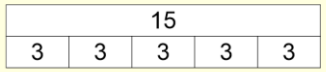
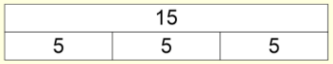
Year group:	NC L.O.	Practical	Pictorial	Abstract	Problem Solving	Reasoning
	On Ave. 6 lessons per objective	**Make it!** **SAY IT**	**Show it/Draw it!** **SAY IT**	**Read/Write it!** **SAY IT**		
2	Recognise the relationships between addition and subtraction **and rewrite addition statements as simplified multiplication statements** e.g. 10 + 10 + 10 + 5 + 5 = 3 × 10 + 2 × 5 = 4 × 10 Understanding of the equals sign being a balance is key.	Counters Objects Hoops, cups or plates for showing 'groups' or 'lots of'. Numicon Unifix Money – 2p, 5p, 10p Dienes (tens) Dice Hands / fingers	Tens frames with different alternating coloured counters to define each number. Pictures of objects and groups. Pictures of practical resources. Arrays Images linked to repeated addition, such as socks, fingers, money	Complete these equations: 10 + 10 + 10 = 10 x ? 2 x ? = 2 + 2 + 2 + 2 5 + 5 + 5 + 5 = 10 x ?		
2	2020 Guidance	2MD–1 Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables.				
2	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.	Counters Objects Hoops, cups or plates for sharing into. Numicon Unifix	Pictures of objects and groups. Pictures of practical resources. Arrays Images linked to 2, 5, 10 such as socks, fingers, money	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Start with the repeated addition of the same number,	Can you draw 14 sweets shared equally into 2 groups? What 2 number sentences can you write for your drawing? Insert a symbol: <=>	Spot the mistake: 

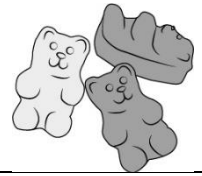
	White Rose have some really good resource examples for 2's, 5's and 10's: https://whiterosemaths.com/wp-content/uploads/2019/SoLs/Primary/Autumn2019-20/Year-2-Autumn-Block-4-Number-Multiplication-and-Division.pdf	Money – 2p, 5p, 10p Dienes (tens) Dice Hands / fingers		showing pupils that this can be inefficient as we add more addends and maybe there's an easier way to represent the calculation. 2 + 0 = 2 2 + 2 = 4 2 + 2 + 2 = 6 2 + 2 + 2 + 2 = 8	9 x 5 ☐ 5 x 9 1 x 10 ☐ 6 x 2 Ben has **five** marbles. Kemi has **seven times** that number.  How many marbles does Kemi have?	Alex says: "There are 10 equal groups with two in each group. There are ten 2's" Mr Moore says "Every number in the 5 times table is even" Mrs Welch says " Every number in the 2 times table is even" Who is correct? Give some examples to show your answer.
	Shape, space, measure and statistic opportunities: Year 1: Recognise and know the value of different denominations of coins and notes (Multiples of 2p, 5p, 10p, £5 and £10 notes)					
2	Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. (Try this on its own as well as drip feed)	Counters Objects Hoops, cups or plates for sharing into. Numicon Unifix Money – 2p, 5p, 10p Dienes (tens) Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign	Tick or Cross these number sentences if they represent this picture:  12 ÷ 3 = 4 12 ÷ 4 = 3 3 ÷ 12 = 4 4 ÷ 12 = 3 Write 4 number sentences for this array: 	**0 x 2 = 0** **2 x 0 = 0** **1 x 2 = 2** **2 x 1 = 2** **2 x 2 = 4** **2 x 2 = 4** **3 x 2 = 6** **2 x 3 = 6** Can you spot any patterns? I think the next number sentences are 5 x 2 = 10 and 2 x 5 = 10. Am I right? Why? Mr Moore thinks: 12 ÷ 4 would give you the same answer as 4 ÷ 12. True or False? Prove it!

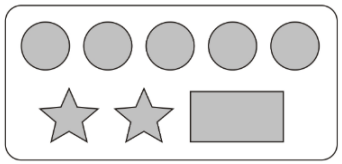
2	Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. (Remember to include halves and quarters)	Counters Objects Hoops, cups or plates for sharing into. Numicon Unifix Money – 2p, 5p, 10p Dienes (tens) Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign	Can you write 4 different ways of sharing these cupcakes? 12 ÷ = 12 ÷ = 12 ÷ = 12 ÷ =  **Mince pies are sold in boxes of 6.** How many boxes can be filled using these mince pies? 	Mrs Wheeldon thinks this image shows: 12 ÷ 2 = 6  True or False? How do you know?

2	Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. (Run alongside the previous two objectives)	Counters Objects Hoops, cups or plates for sharing into. Numicon Unifix Money – 2p, 5p, 10p Dienes (tens) Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign	Apples are sold in packs of 4 How many packs of apples can be filled using the apples from the tree?  Tulips are sold in bunches of 5. Randle buys 30 tulips. How many bunches does he buy? David is hosting a birthday party. He has invited nine children. He will give each child a goody-bag containing ten marbles. How many marbles will he give away in total?	*True or False?*  These all show the same representation. Part of this array is hidden:  The total is less than 16. What could the array be?
2	2020 Guidance	2MD–2 Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotitive division). Year 2 document – Pages 33-34				
Year 3						

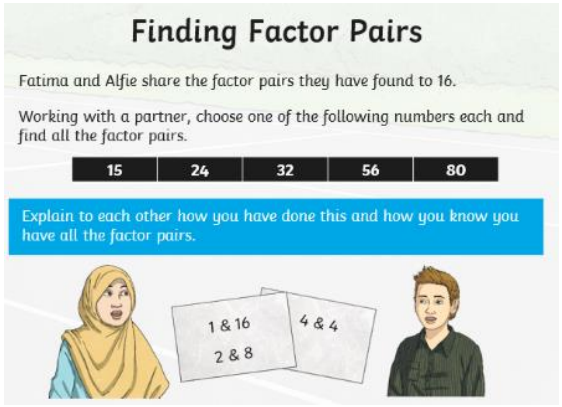
Year group:	NC L.O.	Practical	Pictorial	Abstract	Problem Solving	Reasoning
	On Ave. 8 lessons per objective	**Make it!** **SAY IT**	**Show it/Draw it!** **SAY IT**	**Read/Write it!** **SAY IT**		
3	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.	Counters Objects Hoops, cups or plates for sharing into. Numicon Multilink Dice	Pictures of objects and groups. (Mainly 3, 4 + 8) Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Look at each number sentence. Put a tick (✔) if it is correct. Put a cross (✗) if it is not correct. 8 × 2 = 8 + 8 3 × 10 = 3 + 3 + 3 5 × 4 = 5 + 5 + 5 + 5	Can you write what the diagram below shows as a division **and** as a multiplication.  Mary, Molly and Meg each get £4 pocket money. How much money do they have altogether. In this grid, there are four multiplications.  Write the three missing numbers.	Explain your reasoning.  Dev says,  'When you halve any number that ends in 8 the answer always ends in 4'. Is he correct? Circle Yes or No. Yes / No Explain how you know.

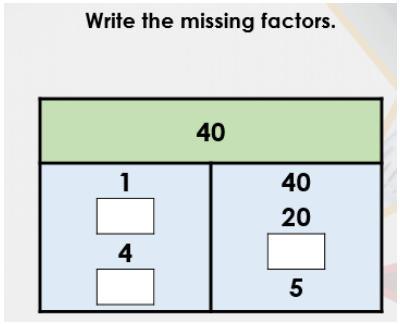
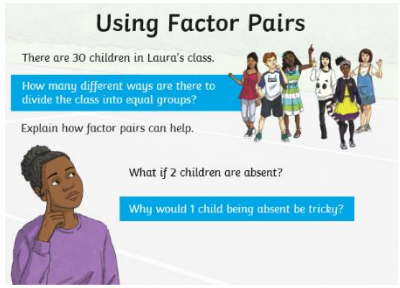
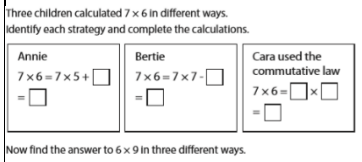
					5 x 3 in a bar model  Can I do it this way?  Discuss and share ideas	
	Shape, space, measure and statistic opportunities: Y2 – Recognise properties of shapes (sides) – How many sides are there on 5 triangles? Four squares? Three octagons?					
3	2020 Guidance	3NF–2 Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number. Year 3 document, pages 27-29				
3	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.	Counters Objects Hoops, cups or plates for sharing into. Numicon Multilink Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model Grid Method	**i) Compare the calculations below using <, > or = 68 x 2 ☐ 34 x 4 **k) Senna buys 3 hair bands, each costing 89p and a hair brush costing £1.25. How much change does Senna get from a five pound note?	**William buys 8 bottles of orange juice, each costing 64p. William says *"I think £5 will be enough to pay for all of the bottles"* Do you agree? Explain why / why not. ***l) Look at the two calculations in question i. (Compare 68 x 2 and 34 x 4) Can you explain why you got the comparison you did? Can you give any other examples? *** What is the largest product you can get my completing a 2x1

						multiplication with 3 **different** digits? Give some examples to prove your answer. ☐☐ X ☐ _____
3	2020 Guidance	3NPV–4 Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts. Year 3 document, pages 22-25				
3	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.	Counters Objects Hoops, cups or plates for sharing into. Numicon Multilink Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model Grid Method	Join each box to the correct number. One has been done for you. 6 × 5 → 30 32 half of 98 44 double 4 × 4 49 Alan has 45 beans. He plants 3 beans in each of his pots. How many pots does he need? A shop sells packs of sweets. Each pack has one red sweet and two green sweets. 	 Tom says: "It will cost over £12 for 2 adults and 3 children to go to the cinema" Do you agree? Explain why / why not.

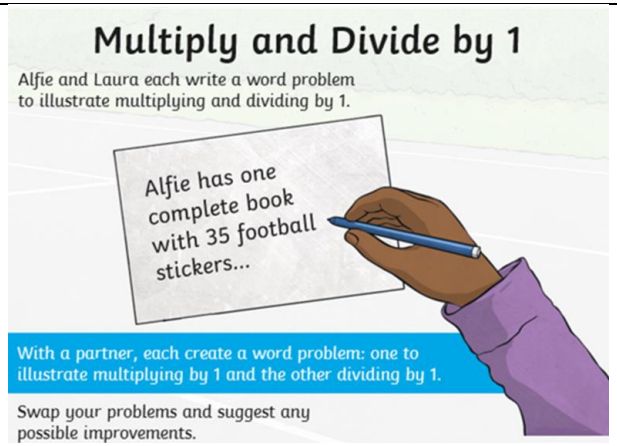
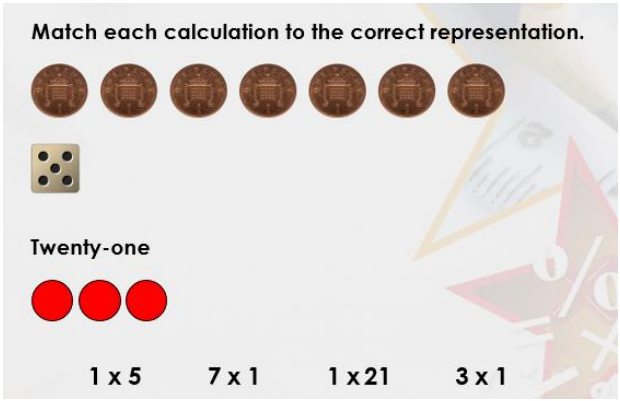
					Sam buys some packs so he has 4 red sweets. How many green sweets does he have? On a sheet of stickers there are 5 circles, 2 stars and one rectangle.  How many stickers are there altogether on 4 sheets? Nisha needs 55 circles. How many sheets of stickers does she need? Ben has 10 sheets of stickers. How many more circles than rectangles does he have?	
3	2020 Guidance	3MD–1 Apply known multiplication and division facts to solve contextual problems with different structures, including quotitive and partitive division. Year 3 document, pages 44-46.				

Year 4						
Year group:	**NC L.O.**	**Practical**	**Pictorial**	**Abstract**	**Problem Solving**	**Reasoning**
	On Ave. 4 lessons per objective	**Make it!** **SAY IT**	**Show it/Draw it!** **SAY IT**	**Read/Write it!** **SAY IT**		
4	Throughout the year Recall multiplication and division facts for multiplication tables up to 12 × 12.					
4	2020 Guidance	4NF–1 Recall multiplication and division facts up to 12 x 12, and recognise products in multiplication tables as multiples of the corresponding number. Year 4 document, pages 26-29.				

4	Recognise and use factor pairs and commutativity in mental calculations.	Counters for arrays Dienes Multi-link cubes for making arrays.	Printed arrays Picture representations of rectangles for area.	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Incomplete factor ladders / rainbows 5 x 4 = ? x 5 Draw lines to match the factor pairs of 20: 4 2 6 1 7 20 4 10 3 5	Place <, >, or = in these number sentences to make them correct: 50 x 4 ▭ 4 x 50 4 x 50 ▭ 40 x 5 200 x 5 ▭ 3 x 300  	Eddie says: "An even number will always have an even number of factor pairs" Is Eddie correct? Can you prove your answer? Miss Tonkin says: "38 must have more factor pairs than 36 because 38 is a larger number" Can you prove whether Miss Tonkin's conjecture is

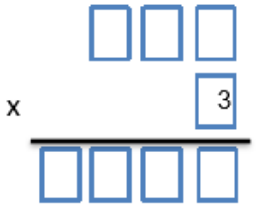
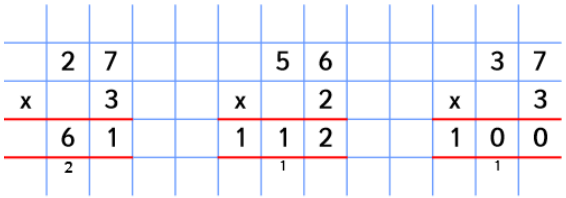
					  The school has a singing group of more than 12 singers but less than 32. They sing together in different ways. Sometimes they sing in pairs and sometimes in groups of 3, 4 or 6. Whatever size groups they are in, no one is left out and everyone is singing. How many singers are there in the school choir? 	correct or not? Fill in the missing numbers 25 x 3 = ☐ x ☐ x ☐ Use factor pairs to solve 15 x 8. Is there more than one way you can do it? 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 Try out more examples to prove your thinking. 

4	2020 Guidance	4MD–2 Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication. Year 4 document, pages 39-43.				
4	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1. Use place value, known and derived facts to multiply and divide mentally, including: Dividing by 1.	Counters Objects PV Charts Hoops, cups or plates for sharing into. Numicon Multilink	Printed PV charts	Missing numbers Missing symbols Move the equals sign Bar Model	Jaden has a job washing cars. He gets £7 for every car he washes. On Saturday he didn't wash any cars as it was raining. How much money did Jaden make on Saturday? Write the problem above as a multiplication: ☐ x ☐ = ☐ Use <, > or = to make the statements below correct: 4 x 1 ☐ 9 x 0 12 x 0 ☐ 0 x 24 51 x 0 ☐ 0 x 51 15 x 1 ☐ 1 x 20	Tick the incorrect calculations: 2 x 1 = 3 5 x 0 = 0 8 x 0 = 0 3 x 1 = 3 Pick one of the calculations that's incorrect and explain why it's wrong. Harvey has written a number sentence. 13 x 0 = 0 He says I can change one number in my number sentence to make a brand new multiplication. Is he correct? Which number should he change? Explain your reasoning. Always, sometimes, never An even number that is divisible by 3 is also divisible by 6.

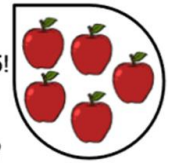
					 Multiply and Divide by 1 Alfie and Laura each write a word problem to illustrate multiplying and dividing by 1. Alfie has one complete book with 35 football stickers... With a partner, each create a word problem: one to illustrate multiplying by 1 and the other dividing by 1. Swap your problems and suggest any possible improvements.  Match each calculation to the correct representation. Twenty-one 1 x 5 7 x 1 1 x 21 3 x 1	

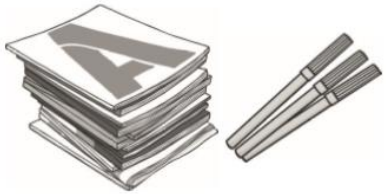
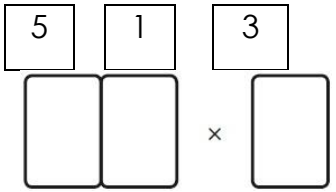
4	Use place value, known and derived facts to multiply and divide mentally, including: multiplying together three numbers.	Counters Objects PV Charts Hoops, cups or plates for sharing into. Numicon Multilink Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model	**1. Make the target number of 90 using three of the digits below.** 2 3 10 3 2 5 ____ x ____ x ____ = 90 **Multiply the remaining three digits together, what is the product of the three numbers?** **Is the product smaller or larger than 90? Can you complete this problem in more than one way?** 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 **Add the missing digits to the calculations below.** 9 x ☐ x 7 = 63 ☐ x 2 x 6 = 48 8 x 4 x ☐ = 96	**Use a fact** 63 ÷ 9 = 7 Use this fact to work out 126 ÷ 9 = 252 ÷ 7 = How many combinations of number can you find that make this equation: ☐ x ☐ x ☐ = 48
4	4MD–1 Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients);	If needed for PV prior to formal multiplication	One, ten and hundred dienes. 1p, 10p and £1 coins	*Complete these calculations: A. 49 x 10 =	** Senna's pencil is 8cm long and Kaelyn's pencil is 6cm long. What is the combined length of their pencils in **millimetres**?	*Mark the calculations, correcting any that are incorrect. A. 212 × 10 = 2120

	understand this as equivalent to making a number 10 or 100 times the size. Year 4 document, pages 36-38.			B. 706 x 10 = C. ? x 10 = 7620 D. 100 x 91= E. 236 x 100 = F. 100 x ? = 4000	**Jamie draws a square that has sides 6cm long. What is the perimeter (length around the outside of the shape) in **millimetres?**  **L. Small matchboxes hold 10 matches and large boxes hold 100 matches. Mr Moore has 45 small and 37 large boxes. How many matches does Mr Moore have in total?  	B. 100 x 50 = 500 C. 44 x 10 x 10 = 4,400 D. 10 x 305 = 3,500 *** Mr Moore has a magic plant that is 32 cm tall. Miss Tonkin also has a magic plant that is 16 metres tall. Mr Moore's plant **doubles** in size every day. Miss Tonkin's plant **halves** in size every day. After how many days will Mr Moore's plant be **taller** than Miss Tonkin's?
	Shape, space, measure and statistic opportunities: Y4 - Converting between millimetres and centimetres / centimetres to metres. We haven't covered this yet but this is a useful context for the objective prior to the measures objectives.					

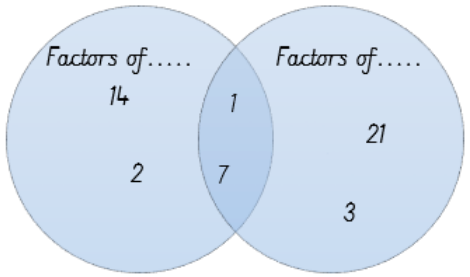
4	Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.	Counters Objects Hoops, cups or plates for sharing into. Numicon Multilink Dice	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model Short Method	What could the numbers in the multiplication be? Every digit is different.  Miss Wood orders some new whiteboard pens for Year 3 and 4. There are 160 children in Year 3 and 4. If she orders 6 boxes of 27 pens, will she have enough? Show your calculation. In one month, Charlie read 814 pages in his books. His mum read 4 times as much as Charlie which was 184 pages more than Charlie's dad. How many pages did they read altogether? Use a bar model to help.  Are they correct? If not, correct the errors.	Always, sometimes, never A one digit number multiplied by a two digit number makes a two digit number Find the mistake that has been made in the calculation below. Explain and correct it. 47 X 8 3256 What digit goes in the missing box? Convince me. 3 ☐ x 4 = 140 Complete these calculations: 123 x 6 = 246 x 3 = What do you notice about the factors and product? Use what you've found to complete this equation: 341 x 8 = __ __ __ x 4

					1. Joe and Ali were having a reading competition. In one month, Joe read 137 pages.  Ali read 3 times as many pages as Joe. How many pages did they read altogether? How many less pages than Ali did Joe read? Use a bar model to help. Joe [137] Ali [137] [137] [137]	
4	2020 Guidance	4MD–1 Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size. Year 4 document, pages 36-38. 4MD–3 Understand and apply the distributive property of multiplication. Year 4 document, pages 44-47.				
4	Dividing numbers with up to three digits by a single digit. Includes interpretation of remainders as part of the 2020 guidance.	Counters Objects Plates, hoops or bags that practical objects can be shared into.	Pictures of objects / dienes in groups. Arrays	*484 ÷ 4 = *? = 936 ÷ 3 *606 ÷ ? = 202 ** Complete the bar model below: 884 **1/2 OF 260 = **Find 1/3 of 129 **Find 3/4 of 856 **705 ÷ 5 = 3 x	*A car dealer receives a shipment of 414 new cars. These cars are shared out across nine dealerships. How many cars does each dealership receive? **Write in the missing digit 0 5 2 9 | 4 [ ] ^{1}8 ** Sally has 4 bags of counters. Each bag contains 165 counters. Sally empties all the bags out and then divides all the counters into **five** equal piles. How many counters are there in each pile? ***A shop has 500 footballs. The shop can buy bags that will hold 2 balls, 3 balls, 4 balls…. All the way up to 9 balls	** Miss Tonkin is trying to calculate 949 divided by 4. Explain why this calculation will not give you a whole number quotient. ***In the calculation on the right the letter P stands for a digit between 1 and 9 and the letter N also stands for a digit between 1 and 9. What could P and N be? Is there more than 1 combination? N N N N | P P P

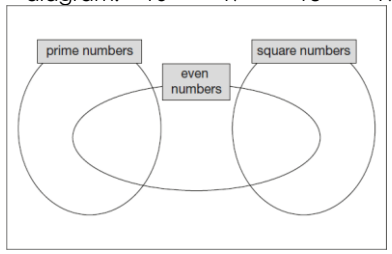
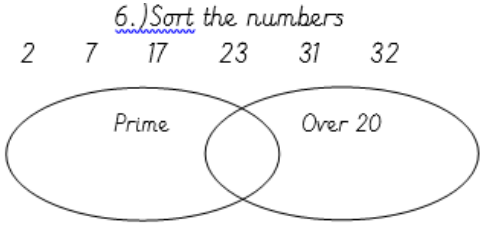
					If I want to split the balls equally with no balls left over. Which bags could I buy?	
4	2020 Guidance	4NPV–4 Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts. Year 4 document, pages 21-25. 4NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, for example: 74 ÷ 9 = 8 r 2 and interpret remainders appropriately according to the context. Year 4 document, pages 29-32.				
4	Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling	Counters Objects Hoops, cups or plates for sharing into. Numicon Multilink	Pictures of objects and groups. Pictures of practical resources. Arrays	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign	1. Simone bought apples in bags like this. She wasn't sure how many bags she bought but it was either 13, 14 or 15! When she counted, there were 75 apples. How many bags did she buy?  Each week Marcella buys a magazine for 60p and 2 colouring pens for 35p each. After 8 weeks, how	Harry says: The distributive law means that: 95 x 6 = 65 x 9 Do you agree with Harry? Prove your answer with some calculations.

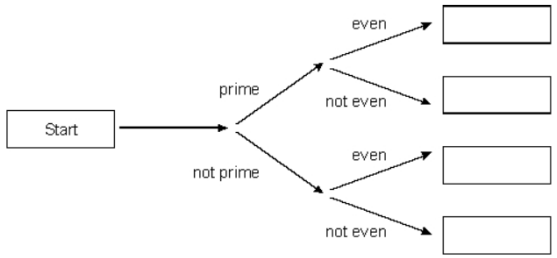
	problems and harder correspondence problems such as n objects are connected to m objects.	Dice		Bar Model Short Method	much has Marcella spent on pens and magazines altogether? Show your workings.  Here is a box of cupcakes: One box of cupcakes: 4 chocolate 2 cherry  If Jack bought 3 boxes of cupcakes. How many chocolate cupcakes would he have? Charlie ends up with **10 cherry cupcakes**. How many **boxes** did Charlie buy? How many **chocolate cupcakes** did Charlie have?	Ashley has three number cards: Ashley wants to arrange the cards to make a 2 x 1 multiplication that gives an even product. Explain why Ashely cannot do this. Back up your response with some example calculations. 
4	2020 Guidance	4MD–3 Understand and apply the distributive property of multiplication. Year 4 document, pages 44-47.				

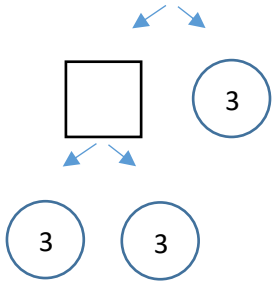
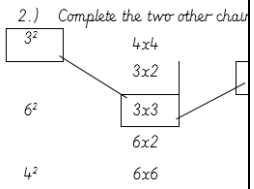
Year 5						
Year group:	**NC L.O.**	**Practical**	**Pictorial**	**Abstract**	**Problem Solving**	**Reasoning**
Objectives running through the unit		• Multiply and divide numbers mentally drawing upon known facts. (Should know 12 x12) • Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. • Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.				
		Make it! **SAY IT**	**Show it/Draw it!** **SAY IT**	**Read/Write it!** **SAY IT**		

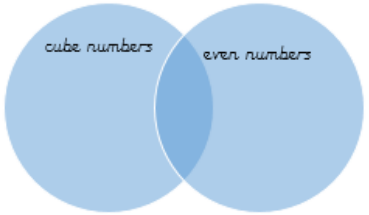
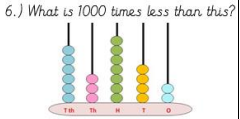
5	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.	Counters for arrays Dienes Multi-link cubes for making arrays.	Printed arrays Picture representations of rectangles for area.	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model (for demonstrating primes) Incomplete factor ladders / rainbows Incomplete prime factor trees. Tick all the numbers below that are factors of both 12 and 18: 2 ☐ 3 ☐ 6 ☐ 9 ☐ 12 ☐	Complete this sentence. Every number with a factor of **10** must also have factors of ☐ and ☐ and ☐ **The Egg box problem** Lily-Rose has 30 eggs. Jack has 20 eggs. Jack and Lily-Rose would like to order some boxes to put their eggs in. They want to order the same size boxes. Neither person wants to have any eggs left over What size boxes could they order? *Write **one number** in each box* *8.) What two numbers are being represented by this Venn diagram?* 	Miss Palk lists the factors of 64: 1, 2, 4, 6, 8, 16, 32 Is Miss Palk correct? Explain your answer. *"Factors come in pairs, so all numbers must have an even number of factors.* *Example: Factors of 6 are 1,6, 2 and 3. That's 4 factors. 4 is an even number."* Is this always, sometimes or never true? Explain your answer.

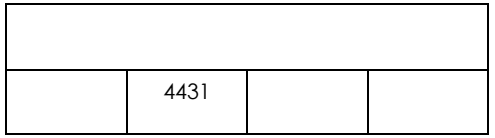
	factor of 24	***not** a factor of 24*
factor of 18		
***not** a factor of 18*		

	Shape, space, measure and statistic opportunities: Year 4 - Find the area of rectilinear shapes by counting squares (Areas of squares and rectangles using arrays)					
5	2020 Guidance	5MD–2 Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors. Year 5 document, pages 46-49.				
5	Establish whether a number up to 100 is prime and recall prime numbers up to 19. Creating an action set for primes up to 19 will help embed those numbers.	Counters for arrays Dienes Multi-link cubes for making arrays.	Hundred squares	Missing numbers Missing symbols Move the equals sign Bar Model (for demonstrating primes) Incomplete factor ladders / rainbows	Emma thinks of two prime numbers. She adds the two numbers together. Her answer is 36 Write all the possible pairs of prime numbers Emma could be thinking of. Write each number in its correct place on the diagram. 16 17 18 19   Here is a diagram for sorting numbers. Write these three numbers in the correct boxes. You may not need to use all of the boxes.	Mr Moore says: "If I add together two prime numbers the total will be even" Is this always, sometimes or never true? Explain your answer.

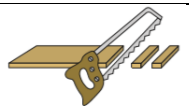
					9 17 20  Charlie has a rectangular garden patio with an **area** of 120m^2. Charlie's patio is a **prime number** wide and a **composite number** long. Write all the possible combinations of length and width that Charlie's patio could be.	
5	Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.	Counters for arrays Dienes Multi-link cubes for making arrays.	Printed arrays Picture representations of rectangles for area Hundred squares Pictorial representations of squares and cubes	Missing numbers Missing symbols Move the equals sign Bar Model (for demonstrating primes) Incomplete factor ladders / rainbows Incomplete prime factor trees Find pairs of numbers that satisfy these equations: A: Prime number + composite number = 20	There are two numbers under 100 that have SIX prime factors. One of them is 64 (2x2x2x2x2x2 or 2^6) What is the other number? Complete this prime factor tree:	What number has the first four prime numbers as its prime factors? Explain how you calculated this? "A three-digit number should have a larger number of prime factors than a two-digit number." Do you agree with Mr Moore? Provide at least 3 examples that prove your answer.

				B: Prime number + prime number = 20 C: 100 = Prime number + composite number D: Prime number + prime number = 100 Find the prime factors of the following numbers: A. 42 B. 28 C. 100 D. 72 E. 64		
5	Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).	Multi-link cubes for making squares and cubes	Pictorial representations of squares and cubes	Missing numbers Missing symbols Move the equals sign Incomplete factor ladders / rainbows 	Put these values in order with the smallest first 5^2 3^2 3^3 2^3 smallest largest 36 and 64 are both square numbers They have a sum of 100 Find two square numbers that have a sum of 130	Prove that 16 is a square number. Give a calculation, pictorial proof and explanation. Spot, explain and correct the mistake below: $7^2 = 7 \times 2 = 14$

					7.) Write each number in the correct place in the diagram 8 4 27 25 125  A square number and a cube number have a sum of 150. What could the two numbers be?	
	Shape, space, measure and statistic opportunities: Year 4 - Find the area of rectilinear shapes by counting squares (Areas of squares and rectangles using arrays) Year 5 - Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes					
5	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.	Counters PV Charts PV Cards Dienes Measuring instruments with conversions on them (measuring jugs, rulers) Coins (1p, 10p, £1)	Printed PV charts Picture representations of dienes / PV cards Pictorial representations of measuring instruments  	Missing numbers Missing symbols Move the equals sign Complete the boxes below: 64 x ☐ = 64,000 64 x ☐ x ☐ = 64,000 64 x ☐ x ☐ x ☐ = 64,000	Put these in order **starting with the smallest** 430 x 10 | 340 x 100 | 403 x 100 | 430 x 100 ☐ | ☐ | ☐ | ☐ 9.) Spot the mistake 430056 ÷ 100 = M | HTh | TTh | Th | H | T | O | t | h 4 3 5 6 I buy ten coffees, each costing £2.70. How much did I spend in total? Napat has 3 metres of ribbon and Harriet has 4 metres of ribbon. How much ribbon do they have altogether? Give your answer in centimetres. Harvey sells 1000 scooter wheels at £8.50 each. He also sells 100 grips at £2.45 each. How much money did Harvey make in total?	James divides 1006 by 100 and gets 10.6. Is James correct? Explain why / why not. Convince Mr Moore that £10.50 is equivalent to 105 ten pence pieces. A recipe for 10 cupcakes calls for 275g of flour. Miss Goatman only wants to make **one** cupcake. Paige thinks Miss Goatman needs 27g of flour. Sophie thinks Miss Goatman needs 27.5g of flour. Who is correct? Prove your answer.

					Mr Moore asks one of his classes to all put up both their hands. He counts 270 fingers and thumbs. How many pupils were in the class? Jack has 128 football stickers and Casey has 142. They decided to share their combined stickers between 10 friends. How many stickers did each friend get? Mr Moore, Miss Palk and Mrs Powell are comparing the size of their kettles. Mr Moore's holds 1450ml, Miss Palk's holds 1230ml and Mrs Powell's holds 2320ml. What is the combined capacity in litres?	
	Shape, space, measure and statistic opportunities: Year 4 – Converting between millimetres and centimetres / centimetres to metres. Year 5 -Convert between different units of metric measure (for example, kilometre and metre; gram and kilogram; litre and millilitre)					
5	2020 Guidance	5NF–2 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth), for example: 8 + 6 = 14, 0.8 + 0.6 = 1.4, 0.08 + 0.06 = 0.14; 3 X 4 = 12, 0.3 X 4 = 1.2; 0.03 X 4 = 0.12. Year 5 document, pages 37-42. 5MD–1 Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size. Year 5 document, pages 42-46.					
5	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.	Dienes to demonstrate partitioning and recombining	Pictorial representations of arrays.	Short and long multiplication methods Missing numbers Missing digits Missing symbols Move the equals sign 2435 x 5 = ? = 8543 x 3 7643 x 11 = 12 x 8405 = ? = 33 x 8007	Mr Moore drives 124 miles every day for a week. Does he travel more than 900 miles over the week? Complete the bar model below:  Write a division fact related to the bar model above. How many hours are there in the month of January? A toy shop orders 11 boxes of marbles. Each box contains 6 bags of marbles.	Casey says "If I multiply a 4-digit number by a single digit number I will never get a 6-digit number" Is Casey correct? Explain why / why not. Jack uses a written method to calculate 2999 x 7. Harriet had worked out the calculation before Jack had even laid out the calculation. How did Harriet work it out so quickly? Lily does the following calculation. Is her answer

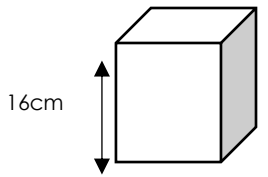
				3456 x 47 = MMXVII x LXXXV =	Each bag contains 45 marbles. How many marbles does the shop order in total? Sarah has the following cards: 3 9 4 5 7 Arrange the cards below to give a product that is an even number. X A car dealer in Plymouth sells 22 cars for £7,250 for. Another car dealer in Exeter sells 17 cars for £9,723 each. The Plymouth dealer says: "I've made more money because I've sold more cars!" Is he correct? Explain why / why not, including calculations.	correct? Can you explain why / why not? 2 5 x 3 2 5 0 + 1 5 0 2 0 0 Look at this calculation: 2824 x 17 = ? Sophie says: "I will get a larger product if I round each number to the nearest 10 and then multiply" Chloe says : I will get a larger product if I multiply both numbers using a formal method **and then** round the product to the nearest 10. Who is correct? Prove your answer.
	Shape, space, measure and statistic opportunities: Year 5 - Measure and **calculate** the perimeter of a rectilinear figure (including squares) in centimetres and metres.					
5	2020 Guidance	5NF–1 Secure fluency in multiplication table facts, and corresponding division facts, through continued practice. Year 5 document, pages 35-36. 5MD–3 Multiply any whole number with up to 4 digits by any one-digit number using a formal written method. Year 5 document, pages 50-53.				
5	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.	"Solid" objects that can't be cut, such as cubes, counters, "Cuttable" resources, such as cake, paper, fruit Coins	Pictorial representations of "solid" and "cuttable" resources	Missing numbers Missing digits Missing symbols Move the equals sign Express the remainder as a whole / fraction / decimal	Jessica has £900 in five pound notes. How many five pound notes does she have? I have a pile of 81 pencils and I want to put them in boxes of 6. How many full boxes can I make? A clown needed seven hundred seventy-nine balloons for a party he was going to, but the balloons only came in packs of seven. How many packs of balloons would he need to buy?	50 ÷ 2 = ? ÷ 4 = 200 ÷ ? Can you find the missing numbers? Can you spot a pattern? Can you explain the pattern? James says:

				What type of remainder will this question give you? 2858 ÷ 2 = 6585 ÷ 5 = 2408 ÷ ? = 4 *F. 1002 ÷ 3 = Complete the bar models: 9120 8854 3.)Spot the mistake and correct: 3 1 4 0 r5 2 ⟌ 6 2 8 5	A 50 cm length of wood is cut into 4 cm pieces. How many 4 cm pieces are cut and how much wood is left over?  Fill in the blanks to represent the problem as division: ☐ ÷ ☐ = ☐ remainder ☐ Fill in the blanks to represent the problem as multiplication: ☐ × ☐ + ☐ = 50	*"To find the divisor in a division calculation you multiply the dividend by the quotient"* Is James correct? Explain your reasoning and prove it with a calculation. 70 printers are to be shared equally amongst 6 office floors. Isaac says "Each floor will receive 11 printers" Harriet says "Each floor will receive 12 printers" Jack says "Each floor will receive 11.666 printers" Who is correct? Convince me with a calculation and explanation. Paige is having a party! Three hundred and six people are invited. Paper plates come in packs of 5. Zen thinks Paige will need 61 packs of plates. Ava thinks she'll need 62 packs of plates. Who is correct? Explain why.
5	2020 Guidance	5NF–1 Secure fluency in multiplication table facts, and corresponding division facts, through continued practice. Year 5 document, pages 35-36. 5MD–4 Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context. Year 5 document, pages 54-57.				

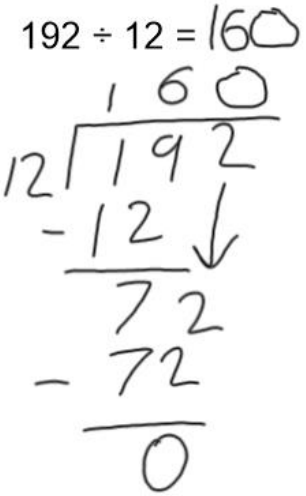
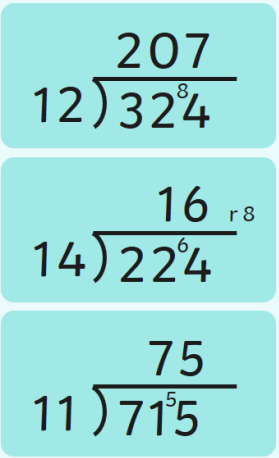
5	Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	Dienes for scaling Coins	Printed PV charts Picture representations of dienes / PV cards Pictorial representations of measuring instruments Conversion graphs Exchange rate graphs	Missing numbers Missing digits Missing symbols Move the equals sign	**Scaling** Here is a recipe for biscuits: 90g flour 50g butter 60g seeds 30ml water  Nigel has 100g of butter to make some biscuits. How much flour, seeds and water will be needed? Explain what you needed to do to get the answer and why. Here is Mr Moore's recipe for the perfect purple paint: • 600ml Blue paint • 300ml Red paint • 100ml White paint Mr Moore wants to make 200ml of purple paint. How much Blue, Red and White paint will he need? Tim has a scale model car that has a width of 7.4cm. The real car is thirty-two times larger than the model car. How wide is the real car?	Sarah is using the following Victoria Sandwich recipe: 200g Flour 150g Caster Sugar 175g Butter 3 Eggs Sarah says " I have 600 grams of flour, 600 grams is 400 grams more than 200g so I need to add 400 to each of my ingredients to scale up my recipe" Is Sarah correct? Explain your answer Jane sees this exchange rate in a travel agent: £1 = $1.4 Jane says "If I exchange £200 I should have over $300" Is Jane correct? Prove and explain your answer.

Year 6

6						
Objectives running through the unit		[EXS] [KEY] Solve problems involving addition, subtraction, multiplication and division. [EXS] [KEY] Perform mental calculations, including with mixed operations and large numbers. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.				
6	Identify common factors, common multiples and prime numbers.	Counters for arrays Dienes Multi-link cubes for making arrays.	Printed arrays Hundred squares Picture representations of rectangles for area.	Number sentences (Include repeated addition.) Missing numbers Missing symbols Move the equals sign Bar Model (for demonstrating primes) Incomplete factor ladders / rainbows Incomplete prime factor trees	Write all the factors of 30 which are also factors of 20. This three-digit number has 2 and 7 as factors. **2 9 4** Write another three-digit number which has 2 and 7 as factors. Here are three digit cards: **1 5 6** Choose two cards each time to make the following two-digit numbers. The first one is done for you. an even number 5 6 a prime number a common factor of 60 and 90 a common multiple of 5 and 13	Prove that 6 is not a factor of seventy. Explain why all multiples of 15 are multiples of 5 but not all multiples of 5 are multiples of 15.

	Shape, space, measure and statistic opportunities: Year 4 - Find the area of rectilinear shapes by counting squares (Areas of squares and rectangles using arrays). Year 5 - Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes					
6	[EXS] [KEY] Use their knowledge of the order of operations to carry out calculations involving the four operations.	Multi-link cubes for making arrays.		Missing numbers Missing digits Missing symbols Move the equals sign Are these brackets needed? Correct these equations	Mark the following calculations, correcting any that you find to be incorrect: • 14 x 2 + 5 = 33 • 20 – 5 x 3 = 45 • 3 + 5 x 8 – 2 = 48 • 4 x 30 ÷ 5 = 24 In each of the equations below, one of the digits needs to be squared for the equation to give the correct outcome. Write the symbol for squared next to each digit. • A. 4 + 3 – 2 = 11 • B. 6 x 6 ÷ 2 = 9 • C. 100 ÷ 5 – 4 = 0 Create a number sentence that contains brackets, an order, a division, multiplication, addition and subtraction that equates to 100.	Write an explanation of how to approach and work out a number sentence that has several operations. Look through these number sentences and say whether the brackets are necessary or not: • (9 + 7) x 4 = 64 • (4 x 3) ÷ 2 = 6 • 40 ÷ (5 x 2) = 4 • (5 x 5) - (7 - 3) = 21 • 32 - (6 x 4) = 8 • 32 - (6 x 6) + 1 = -3 Explain why the brackets are necessary or not.
6	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.	Dienes to demonstrate partitioning and recombining	Pictorial representations of arrays.	Short and long multiplication methods Missing numbers Missing digits Missing symbols Move the equals sign	Mr Moore's mobile phone contract costs £28 per month. How much does it cost over a year? Miss Goatman buys a sandwich for £2.75 and a yogurt for 65p. She buys the same combination every day for 2 weeks. How much money does she spend? How many 1 cm3 cubes can I fit into a cube that's 16cm high? 	The Y6 National Curriculum statement for multiplication is as follows: "Pupils should be taught to: …Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication." What is the hardest calculation you can create within those constraints? Explain your choice. Leon writes a calculation for Taima to complete:

					Simon is cutting some pipe for a bathroom installation. He needs 26 lengths of 75cm. He has four 5 metre long pipes in his van. Does Simon have enough pipe? Show your workings	345 x 144 Taima says ' I can't complete this calculation as I haven't been taught how to multiply by a three digit number'
	Shape, space, measure and statistic opportunities: Year 5 - Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes					
6 This is not an official objective but is a good intro to division with double-digit divisors.	Divide numbers up to 4 digits by a two-digit whole number by using factor pairs of a number	Dienes Counters Coins "Solid" objects that can't be cut, such as cubes, counters, "Cuttable" resources, such as cake, paper, fruit	Pictorial representations of "solid" and "cuttable" resources	Missing numbers Missing digits Missing symbols Move the equals sign Express the remainder as a whole / fraction / decimal What type of remainder will this question give you? Compare these calculations using <, > or =: 2,400 ÷ 30 2,400 ÷ 10 ÷ 3 What do you notice?	Complete these calculations by finding two single digit factor pairs for each divisor. i. 1700 ÷ 20 = ii. 1608 ÷ 24 = iii. 8,000 ÷ 64 = Use factor pairs to find the following fractions of amounts: i. 1/30 of 3,780 = ii. 1/16 of 3,888 = iii. 4/18 of 3,996 =	*C. Mr Moore is trying to complete the following division: 893 ÷ 19 Dominic says: "Mr Moore won't be able to use factor pairs to simplify his division" Explain why Dominic is correct.
6	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	Dienes Counters Coins "Solid" objects that can't be cut, such as cubes, counters, "Cuttable" resources, such	Pictorial representations of "solid" and "cuttable" resources	Missing numbers Missing digits Missing symbols Move the equals sign Express the remainder as a whole / fraction / decimal	An egg factory has 540 eggs to place into boxes of twelve. How many boxes can they fill? Betty raises £287 during a sponsored cycle and Cory raises £633 during a sponsored swim. They decide to share their combined funds between 20 local charities. How much does each charity receive? A coach carries 61 passengers. There are 1,368 football fans that want to travel to an away match. How many coaches are needed to carry them all?	Explain the mistake that has been made in the calculation below:

	appropriate for the context. (Minimum amount of time, move on to short)	as cake, paper, fruit		What type of remainder will this question give you?	Leon is selling cupcakes. His ingredients cost £8.18. He is selling his cakes for 35p. How many does he need to sell to make a profit? Tom gives his cat the same amount of food every day. A 4.5kg bag of cat food lasts for 32 days. How much does his cat eat each day? Round your answer to the nearest gram.	
6	[EXS] [KEY] 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.	Dienes Counters Coins "Solid" objects that can't be cut, such as cubes, counters, "Cuttable" resources, such as cake, paper, fruit	Pictorial representations of "solid" and "cuttable" resources	Missing numbers Missing digits Missing symbols Move the equals sign Express the remainder as a whole / fraction / decimal What type of remainder will this question give you?	An egg factory has 540 eggs to place into boxes of twelve. How many boxes can they fill? Betty raises £287 during a sponsored cycle and Cory raises £633 during a sponsored swim. They decide to share their combined funds between 20 local charities. How much does each charity receive? A coach carries 61 passengers. There are 1,368 football fans that want to travel to an away match. How many coaches are needed to carry them all? Leon is selling cupcakes. His ingredients cost £8.18. He is selling his cakes for 35p. How many does he need to sell to make a profit? Tom gives his cat the same amount of food every day. A 4.5kg bag of cat food lasts for 32 days. How much does his cat eat each day? Round your answer to the nearest gram.	Check these calculations, explaining any mistakes that have been made  Do you prefer long or short division? Explain why.

Changelog

2020-21

Moved Y5 square and cube objectives to come after all prime numbers had been completed.

Added in 2020 non-statutory guidance (cells filled in blue)

2021-22

Added in opportunities for shape, space, measure and stats to be slipped in

Removed the Y4 ‘Recall multiplication facts’ objective as we teach this throughout the year.