Calculations Policy

School Responsibility: Miss K. Choma
Headteacher: Miss K. Choma
Governor: Mr Thompson
Adopted: May 2021
Review: May 2023

ETHOS STATEMENT

The School was founded by and is part of the Catholic Church. The School is to be conducted as a Catholic School in accordance with the canon law and teachings of the Catholic Church and in accordance with the Trust Deed of the Diocese of Leeds in particular:

1. Religious education is to be in accordance with the teachings, doctrines, discipline and general and particular norms of the Catholic Church;
2. Religious worship is to be in accordance with the teachings, doctrines, discipline and liturgical norms of the Catholic Church;
3. And at all times the school is to serve as witness to the Catholic faith in our Lord Jesus Christ.

MISSION STATEMENT

St Joseph is our patron saint and he inspires and guides us in our school mission:
Each one of us is part of God's family and we are all special.
As God's children and family we love one another, pray together, play together and walk hand in hand with God.
God is our teacher and we are his gifts. He helps us learn together, work hard and do our best to make our world a better place.
With fun, laughter and friendship we celebrate God's love.
We respect and care for everyone and for God's wonderful world.

As a family with God in our hearts we love, laugh and learn.

St Joseph's Otley – Calculations Policy

Introduction

The ability to calculate in your head is an important part of mathematics; it is also an essential part of coping with society's demands and managing everyday events. At St. Joseph's the aim is for children to apply mental and written strategies confidently and efficiently. The progression of the mental and written calculation skills and the methods and strategies used is documented in this policy. These are based upon the new maths curriculum 2014. Mental and written calculation methods are taught alongside each other throughout the entirety of key stage one and key stage two. When teaching children to calculate, emphasis is placed on choosing and using the method that is most efficient. If a child can complete a calculation mentally or with jottings, they should not be expected to complete a written algorithm.

To support the development of mathematical understanding, we use the process of CPA:

Concrete – physical objects that support the concept of number and calculating number, whether it be conkers, apples or dinosaurs to counters. These physical objects play a fundamental role on giving the children hands on experience of number.

Pictorial – using drawings and pictures to represent the physical objects, therefore developing the visualisation of number and the calculating process. Pictures of apples to pictures of circles may represent number.

Abstract – using symbols to represent number and the calculating process, i.e. 4 + 6 = 10, this relies heavily on the previous experience so that children have a keen understanding of what each symbol means.

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value.

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value.

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

This document presents the methods and representations across the whole school.

This guidance has been developed from the White Rose Calculation Policy: working document, which was written as a guide to indicate the progression through Addition, Subtraction, Multiplication and Division in Years R – 6.

How can parents and carers help?

Every parent and carer can do their bit to help inspire their children to be successful in maths by:

- Show your child that you like the subject giving them the confidence that they can do it too - especially girls.
- Go shopping with real money (not a credit card) so that children can experience using coins, paying bills and experiencing 'change'.

St Joseph's Otley – Calculations Policy

- Let children play maths at home- whether it is using litre jugs in the bath for measuring liquids or weighing ingredients in the kitchen-real life practise really helps children to understand how to estimate measures and apply knowledge.
- Play board games like Snakes and Ladders, Monopoly, Pop to the Shops, Top Trumps etc
- Help children to understand how to use bus or train timetables, maps, co-ordinates by playing 'Battleships'
- Practise telling the time with your child- ask questions: What time is the TV programme they would like to watch? When does it start? When does it finish? How long is it on for?

St Joseph's Otley – Calculations Policy

7 + 8 = 15
Addend + Addend = Sum

16 − 7 = 9
Minuend − Subtrahend = Difference

$$8 \times 5 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 40$$

8 times

8 × 5 = 40
Multiplier   Multiplicand   Product

dividend

$$\frac{24}{6} = 4$$ quotient

divisor

$6\overline{)24}$ quotient divisor dividend

$$24 \div 6 = 4$$ quotient divisor dividend

Addition

7 + 8 = 15

Addend + Addend = Sum
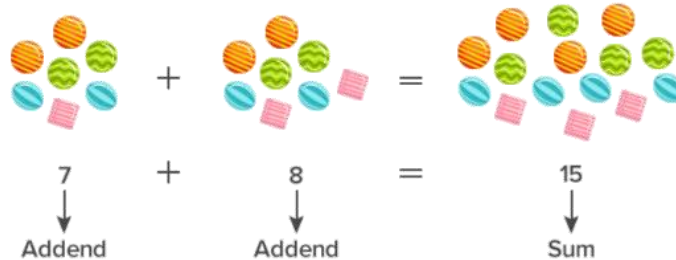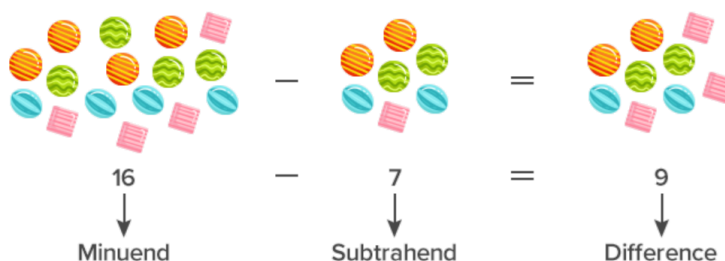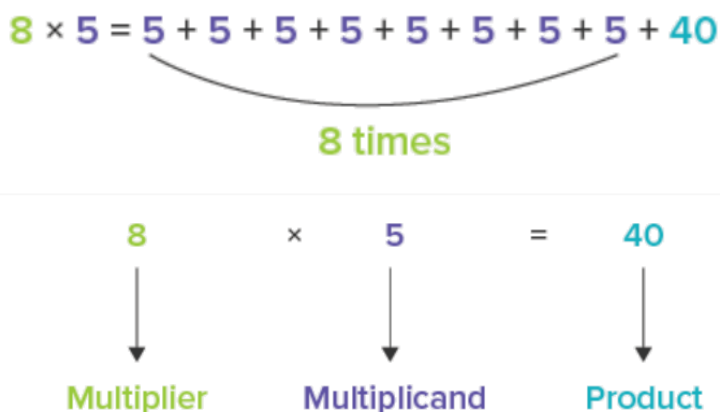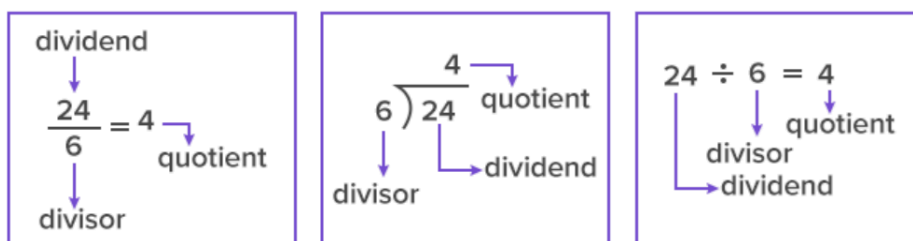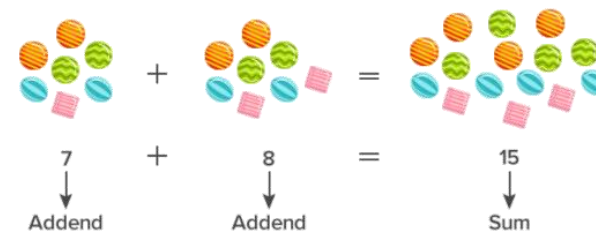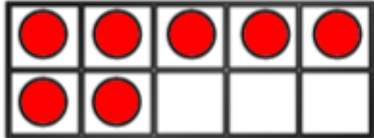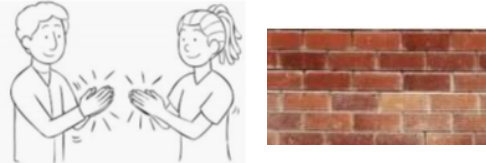
Addition- EYFS			
Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, balancing, part, part, whole, addend			
Objectives	**Concrete**	**Pictorial**	**Abstract**
Count objects by saying one number name for each item			
Counts actions or objects which cannot be moved	 Clapping games. Listen and count claps, or count how many bricks high the wall is.		
Represent amounts with numerals. For example: children can put 5 blocks on a 5 card.		 Use the IWB WRM notebook slides.	

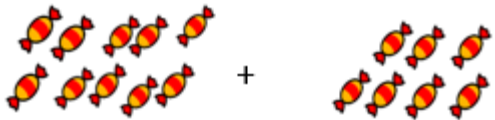| Finds the total number of items in two groups by counting all of them.			Use the part-whole model to move to the abstract.
		Maths	2 + 3 = 5 3 + 2 = 5 5 = 2 + 3 5 = 3 + 2
	Language to use: 2 is a part, 3 is a part and 5 is the whole.	**stories** E.g. First, there was 3 ducks in a pond and then two more ducks came, now there are 5 ducks in the pond. First Then Now	6+4= 10 4+4=8 5+2=7 2+4=6 2 3 The use of ten frames and number sentences alongside.
	Sarah has 2 apples and Jon has 5 apples. How many apples fo they have altogether? How many more apples does Jon have then Sarah?	Bar models using visuals, pictures/iocns or colours.	3 + 2 = 5 2 + 3 = 5 5 = 3 + 2 5 = 2 + 3 3 2 5 2 3 5 5 3 2
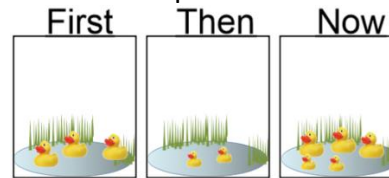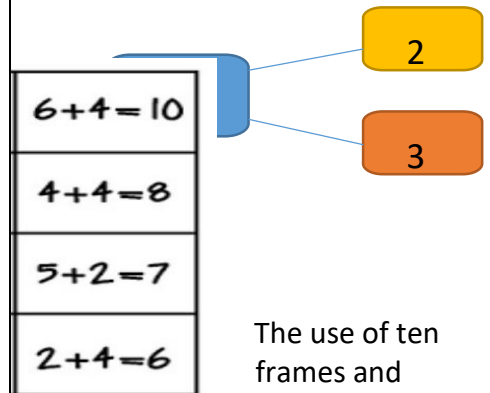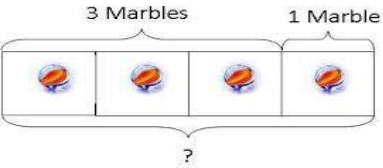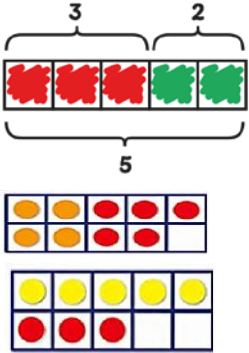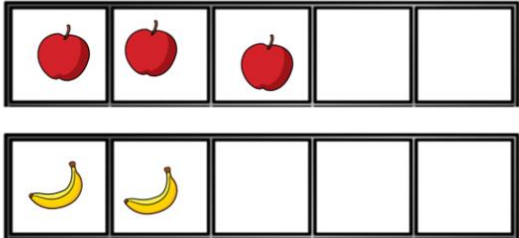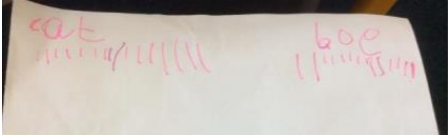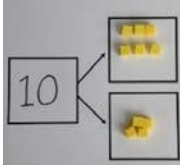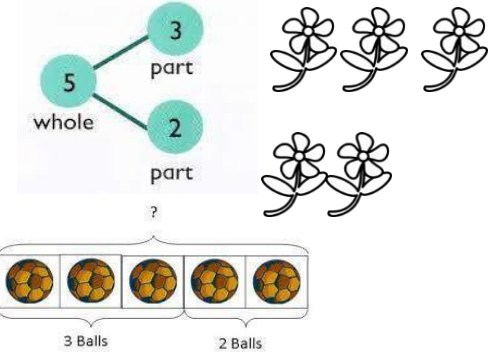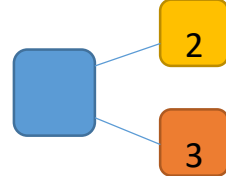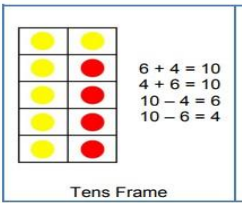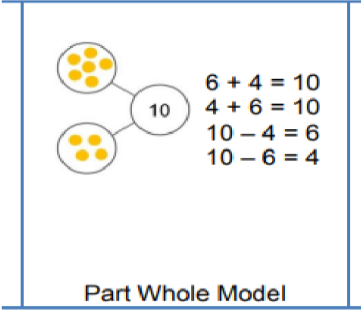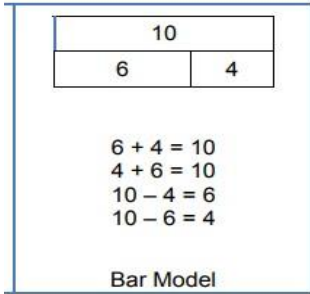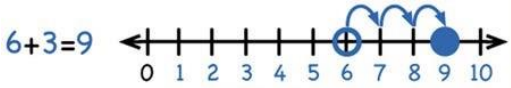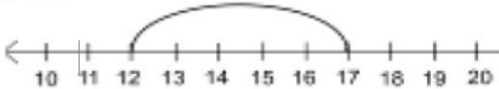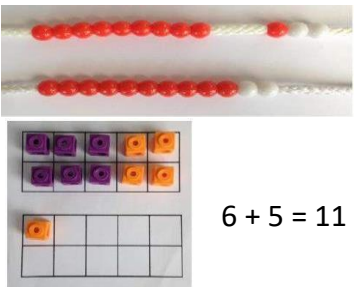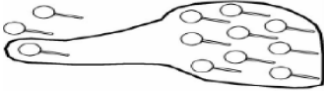
|			
	3 Marbles 1 Marble ? 	3 2 5 	
Finds one more in a group of objects. Says the number that is more than a given number.		 There is one more apple than the bananas.	1 more 1 more than 4 is 5
Records using marks that they can interpret and explain.			

Addition- Year 1

Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, balancing, part, part, whole, addend

Objective and Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	Use cubes to add two numbers together as a group or in a bar. (Some children may still need to use real objects) Use part-part whole model	Use the pictures to add two numbers together as a group or in a bar. | 3	2 | The Bar Model will be continued from EYFS as a method to support problem solving involving addition, continuing with the concrete representations and moving onto using pictorial representations of objects. Some children will also move onto the abstract.	$2 + 3 = 5$ $3 + 2 = 5$ $5 = 3 + 2$ $5 = 2 + 3$
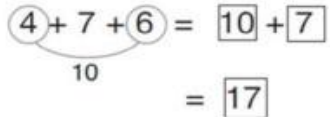
Represent and use number bonds and related subtraction facts within 20	Tens Frame (Some children may need to initially use real objects then move onto the representation, egg boxes may also be used to support this)	6 + 4 = 10 4 + 6 = 10 10 – 4 = 6 10 – 6 = 4 Part Whole Model	10 / 6 / 4 6 + 4 = 10 4 + 6 = 10 10 – 4 = 6 10 – 6 = 4 Bar Model Bar model and part-part whole to be used alongside abstract
Addition and subtraction of one-digit and two-digit numbers to 20 including 0.		6+3=9 0 1 2 3 4 5 6 7 8 9 10 Start at the larger number on the number line and count on in ones.	5 + 12 = 17 17= 12 + 5
Start at the bigger number and counting on	Start with the larger number on the bead string and then count of to the smaller number 1 by 1 to find the answer.	12 + 5 = 17 10 11 12 13 14 15 16 17 18 19 20 Start at the greater number on the number line and count on in ones or jump to find the answer and count how many.	Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10 (The 'Make 10' strategy)	6 + 5 = 11 Start with the greater number and use the smaller number to make 10.	3 + 9 = Use pictures or a number line. Regroup or	If I am at seven, how many more do I need to make 10. How many more do I add on now? 7 + ___ = 10 Learn these known number bonds to 10 to help with addition. 7 + ___ = 11 7 + 3 = 10 10 + 1 = 11 7 + 4 = 11
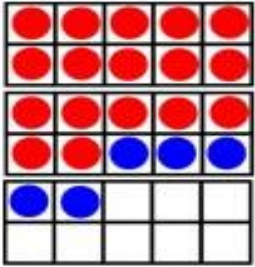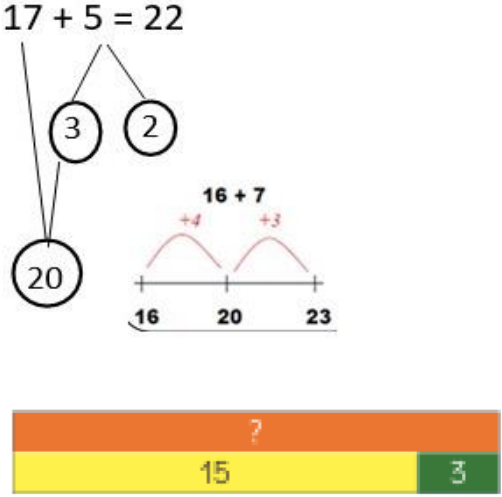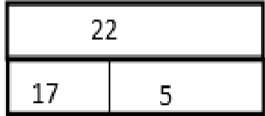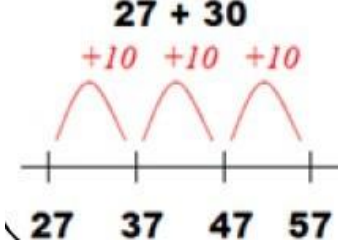
<table>
<tr>
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<td>
Partition the smaller number using the part part whole model to make 10.

9 + 5 = 14

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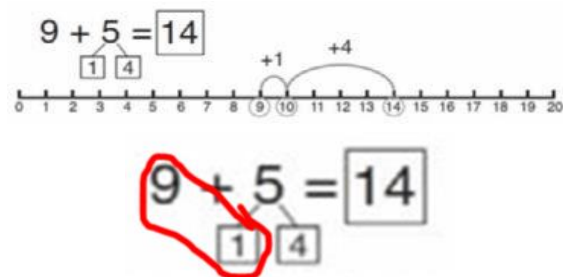
Addition- Year 2

Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, addend,

Objective and Strategy	Concrete	Pictorial	Abstract
Adding 3 1-digit numbers	**4 + 7 + 6= 17** Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with two digits (if possible) and then add on the third digit.	Add together the groups of objects. Draw a picture to recombine the groups to make 10. 	$4 + 7 + 6 = 10 + 7$ $= 17$ Combine the two numbers to make 10 and then add on the remainder.

Adding a 2-digit number and ones	17 + 5 = 22 Use the ten frame to make 10 – children can then explore the patterns: 27 + 5 = 22 37 + 5 = 32	Use the part part whole model to help with the number line. 17 + 5 = 22 3 2 16 + 7 +4 +3 20 16 20 23 Bar ? 15 3 Model structure	17 + 5 = 22 Explore related facts: 22 17 | 5 17 + 5 = 22 5 + 17 = 22 22 – 5 = 17 22 – 17 = 5
Adding a 2-digit number and multiples of 10	25 + 10 = 35 Explore that the ones digit does not change	**27 + 30** +10 +10 +10 27 37 47 57 Base 10 may be used above the number line initially. The calculation will be shown alongside the number line to see the connection.	27 + 10 = 37 27 + 20 = 47 27 + ___ = 57 ___ + 40 = 67 (procedural variation fluency)

| Adding two 2-digit numbers (No re-grouping) | 24 + 15 =
 Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto the place value counters.
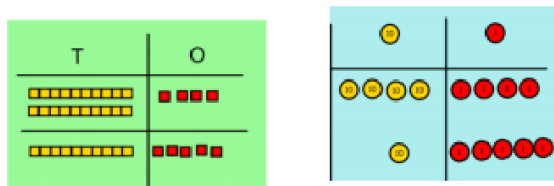
 (Some children may not be ready for place value counters in Y2)
 Numicon may also be used too.
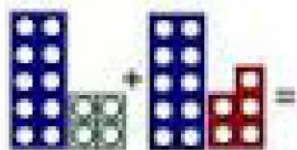
  | After practically using the Base 10 blocks and place value counters to help them solve additions.
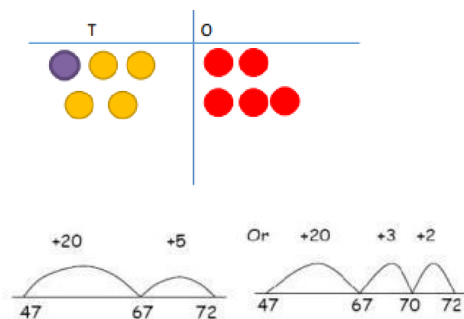
  Use

 number line and bridge ten using part whole if necessary.
 Base 10 may be used above the number line.

 The calculation will be shown alongside the number line to see the connection.

 | Model | Calculation |
 \|-------\|-------------\|
 \| \| \|

 The Bar Model (Singapore maths) will be used to support problem solving moving onto the generalisation that b+c=a. Children will focus on using the abstract representation with the pictorial to support where necessary.

  | Partitioning:

 35 + 47
 30 + 5   40 + 7
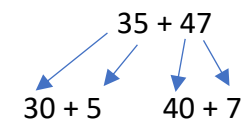
 30 + 40 = 70
 5 + 7 = 12
 70 + 12 = 82
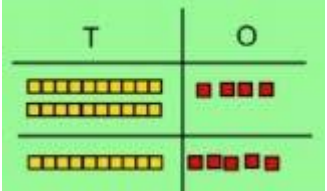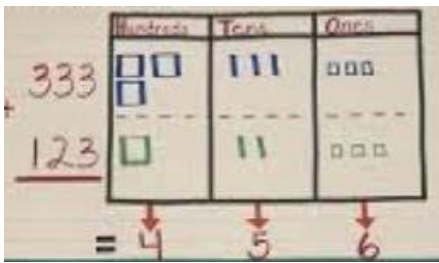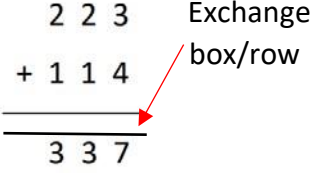
 Recording addition in columns supports place value and prepares for formal written methods with larger numbers.

 Toward the end of the year, children move to more formal recording using partitioning method:

 40 + 7
 30 + 5
 ――――――
 70 + 12 |

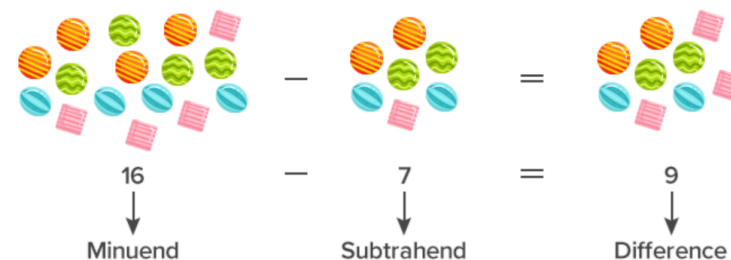## Addition- Year 3

Vocabulary: addition add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, exchange row/box, addend

Objective and Strategy	Concrete	Pictorial	Abstract
Add and subtract numbers with up to 3-digits, using formal written methods of columnar addition Column addition (no regrouping)	Using manipulatives (Base 10, numicon, counters), children are to line up hundreds, tens and ones. Place Value Grid — Calculation (White Rose Maths) $43 + 24 =$ $\begin{array}{r} 4\ 3 \\ +\ 2\ 4 \\ \hline 6\ 7 \end{array}$ Children should be secure with using PV counters before moving onto pictorial. The calculation will be shown alongside the model used to see the connection (see above) 	Model	Calculation
---	---
			Children are to draw, in a PV frame, the manipulatives, that they are using. Secure knowledge of representation with the PV columns. The calculation will be shown alongside the model to see the connection. | Model	Calculation
---	---
			$\begin{array}{r} 2\ 2\ 3 \\ +\ 1\ 1\ 4 \\ \hline 3\ 3\ 7 \end{array}$ Exchange box/row Children to move onto recording more formally. (Introduce the exchange row/box to column addition for exchanges/regrouping) Some children may need to use the expanded method (see below).

Column addition (with regrouping)		Children can draw a representation of the grid to further support their understanding, exchanging the ten *underneath* the line.	$$20 + 5$$ $$\underline{40 + 8}$$ $$60 + 13 = 73$$ Children are to begin with the abstract: expanded form. For those children, that are confident after AFL, the below method should be used.
	Exchange ten ones for a ten. Model using Dienes, Base 10, Numicon and place value counters.		
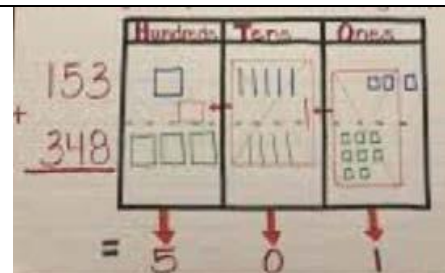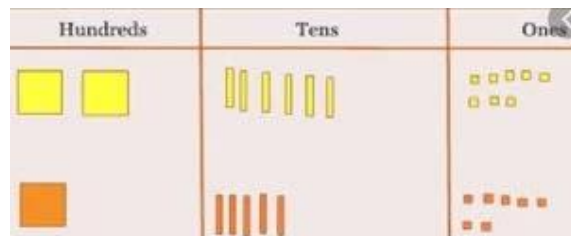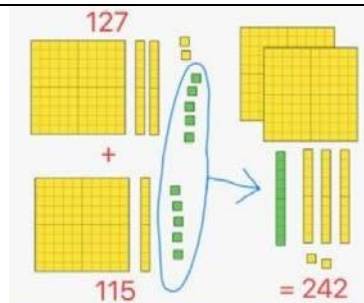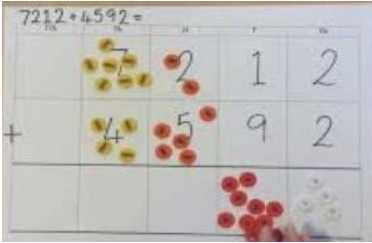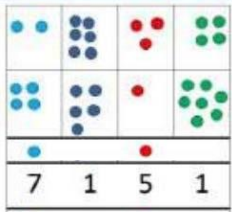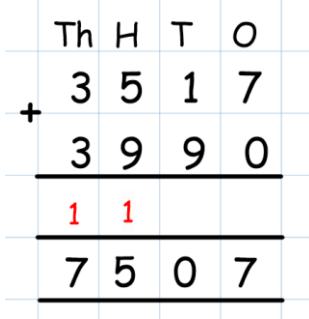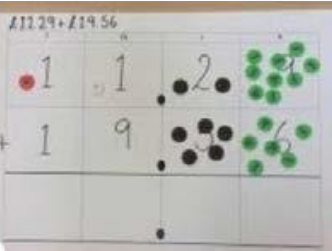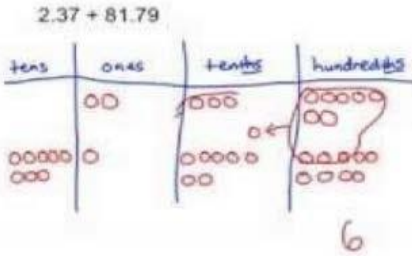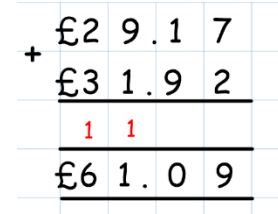
Addition- Year 4

Vocabulary: addition add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, addend, decimal and decimal point.

Objective and Strategy	Concrete	Pictorial	Abstract

Using formal written methods of columnar addition where appropriate
 	
Add numbers with up to 4 digits (with exchange)
	Children continue to use dienes/ Base 10 or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.
	
	7212+4592=
	
	The calculation will be shown alongside the manipulative used to see the connection.
	
	| Model
		Calculation |
		|---|---|
		| | |
			
			Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.
				Th H T O
				+ 3 5 1 7
				  3 9 9 0
				    1 1
				  7 5 0 7
				
				Continue from previous work to exchange thousand and tens column.

Add decimals with 2 decimal places, including money.	Introduce decimal place value counters and model exchange for addition.	2.37 + 81.79
		
		tens ones tenths hundredths
			+ £2 9 . 1 7
			  £3 1 . 9 2
			    1 1
			  £6 1 . 0 9
			
			As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

Addition- Year 5/6			
Vocabulary: addition, addend, add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, decimal, decimal point			
Objective and Strategy	**Concrete**	**Pictorial**	**Abstract**
Add numbers with more than 4 digits.	See Year 4	See Year 4	Children should have abstract supported by a pictorial or concrete if needed.
Add several numbers of increasing complexity, including: adding money, measure, decimals with different decimal points.	See Year 4	See Year 4	Insert zeros for place holders.

Subtraction

16 − 7 = 9
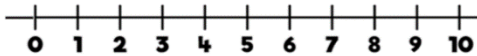
Minuend − Subtrahend = Difference

Subtraction- EYFS			
Vocabulary: minuend, subtrahend, equals, fewer, less, difference, equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…			
Objectives	**Concrete**	**Pictorial**	**Abstract**
Using concrete strategies for counting	Taking away after a counting out objects. Children are encouraged to physically remove these using touch counting. By touch counting and dragging away, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch the among that are left to find the answer.		Those who are ready may record their own calculations
Uses language of more and fewer to compare two sets of objects	Are there more yellow or red spots? Are there fewer red or yellow spots?	Use a number line to say how many fewer a given number is. 0 1 2 3 4 5 6 7 8 9 10	Identifying one more or less on a number track

| Subtracting 1 digit number by a 1 digit number | **8 – 4 = 4**

Use a ten frame to show the whole and remove the physical.

The use of practical objects such a numicon, cubes, beads strings.

Use visual supports such as ten frames, part part whole and subtraction mats, with the physical objects and resources that can be manipulated. | **8 – 4 = 4**

In the pictorial method, cross off the items on the ten frame. When children are ready, introduce a number line alongside to show the number becoming less.
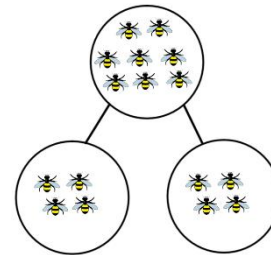
Part part whole models can be used.

Bar models can be used too. | Have a focus on the symbols and the various names for them.
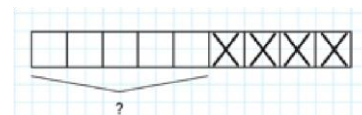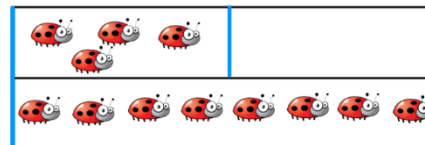
When children are ready, they can have a go at number sentences.
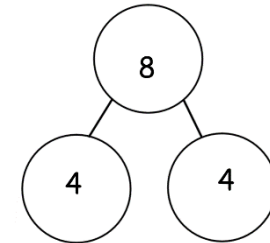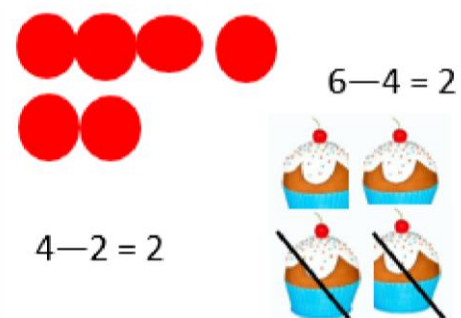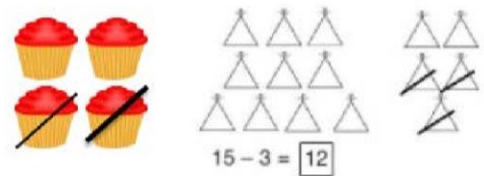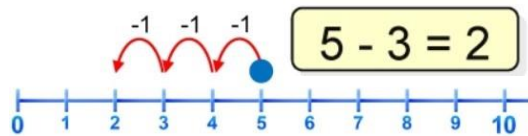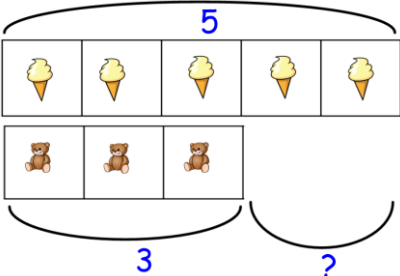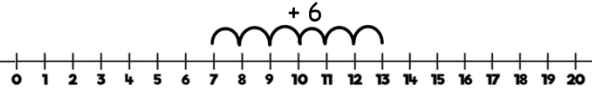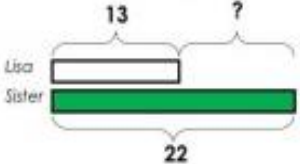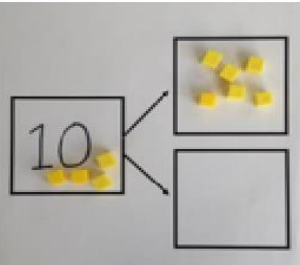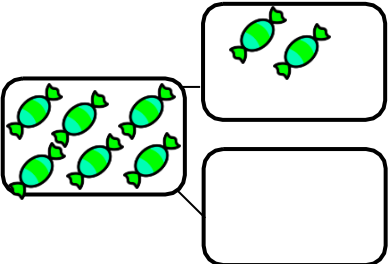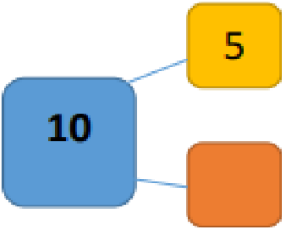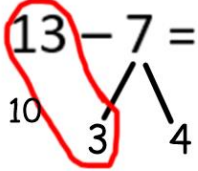
8 – 4 = 4 |

Subtraction- Year 1

Vocabulary: equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…

Objectives	Concrete	Pictorial	Abstract
Subtract one-digit and two-digit numbers to 20, including 0. Taking away ones	Use physical objects, counters, cubes to show how objects can be taken away. $6-4=2$ $4-2=2$	Cross out drawn objects to show what has been taken away. $15-3=\boxed{12}$	$7-4=3$ $16-9=7$
Counting back	Make the larger number in the subtraction. Move the beads along the bead strings as you count backwards in ones. $13-4$ Use the counters and move them away from the group as you take away counting backwards as you go.	-1 -1 -1 $5-3=2$ 0 1 2 3 4 5 6 7 8 9 10 Count back on a number line or 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 you)

Find the difference	Compare the objects and amounts	Count on to find the difference	Word problems to find the difference.
	Compare the objects/amounts. There are 2 more ice creams than bears. There are 2 less bears than ice creams. Lay the objects to represent a bar model.	+ 6 Draw the bars out to find the difference beween two numbers. **Comparison Bar Models** Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them. 13 ? Lisa Sister 22	Hannah has 12 sweets and her sister has 5. How many more sweets does Hannah have than her sister? 12 – 5 = ____

| Represent and use number bonds and related subtraction facts within 20. Part-part whole models | Link to addition. Use part part whole model to model the inverse. If 10 is the whole and 6 is one of the parts, what is the other part? $$10 - 6 = 4$$ | Use a pictorial representation of objects to show the part-part whole model. | Part-part whole model used with numbers. $13 - 7 =$ 10 3 4 $10 - 4 = 6$ Circle the 13 and 3, 13 -3 = 10 then 10 – 4 = 6 |

Make 10	$14 - 9 =$ Make 14 on the ten frames. Take away the four to make 10 and then takeaway one more so you have taken away 5. You are left with the answer 9.	$13 - 7 = \boxed{6}$ Start at 13, takeaway 3 to reach 10. Then takeaway the remaining 4 so you have taken away 7 altogether. You have reached your answer.	$16 \quad - \quad 8 =$ 10 6 6 2 $16 - 6 = 10$ $10 - 3 = 8$ How many do we take off to reach the next 10? How many do we have left to take off?
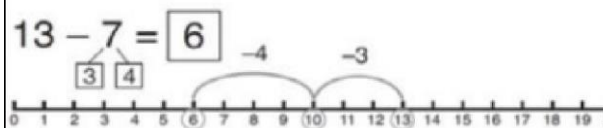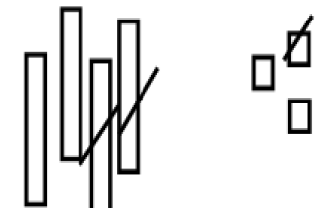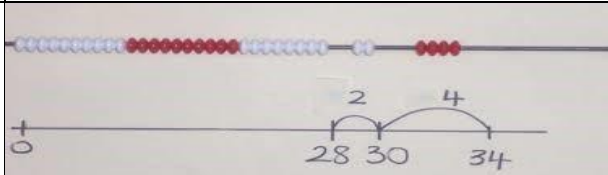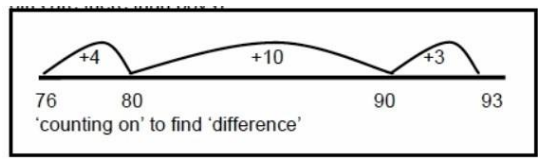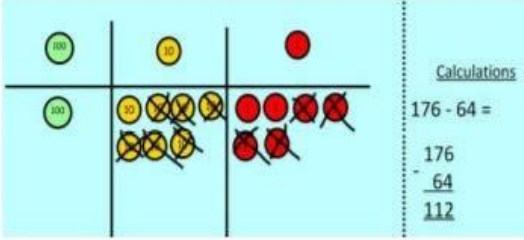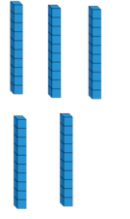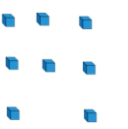
Subtraction- Year 2

Vocabulary: subtrahend, minuend, equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is, difference, count on, strategy, partition, tens, ones

| Objective and Strategy	Concrete	Pictorial	Abstract
Subtract a two-digit number and ones, a two digit number and tens, two two-digit numbers Partitioning to subtract without re-grouping: *'Friendly numbers'*	34 – 13 = 21 Partition the number when subtracting. First subtract the ones and then the tens (no regrouping) The calculation will be shown alongside the manipulative used	Model	Calculation		Children draw representations of Base 10 and cross out to show subtraction. 43—21 = 22	43—21 = 22 Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers. Toward the end of the year, children move to more formal recording using partitioning method: 43-21=22 40 and 3 -20 and 1 20 and 2
Make ten strategy – counting on	34 – 28 = 6 Use a bead bar or bead strings to model counting to next ten and the rest.	'counting on' to find 'difference' Use a number line to count on to next ten and then the rest.	93—76 = 17 76 + 4 = 80 80 + 10 = 90 90 + 3 = 93 4 + 3 + 10 = 17

Subtraction- Year 3

Vocabulary: minuend, subtrahend, difference, equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, hundreds, tens, ones, tenths

Objective and Strategy	Concrete	Pictorial	Abstract
To subtract numbers with up to three-digits, using formal written methods of columnar subtraction Column subtraction (without exchanging)	 $59 - 15 =$ When subtracting the subtrahend, you physically take the Base ten, Numicon or place value counters away. The calculation will be shown alongside the model chosen to see the connection. 	Model	Calculation
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			Children are to be secure with use of PV counters before moving onto abstract. 176 - 64 =	Children should begin with the expanded form. $$47-24=23$$ $$\begin{array}{r} 40+7 \\ -\ 20+4 \\ \hline 20+3 \end{array}$$ Moving onto a more formal way as below. $$\begin{array}{c|c|c} H & T & O \\ \hline & 2 & 5\ 9 \\ -\ 1 & 0 & 5 \\ \hline 1 & 5 & 4 \end{array}$$ When using the formal method, ensure the correct vocabulary is used. For example: **9 ones subtract 5 ones equals 4 ones. 5 tens subtract 0 tens equals 5 tens. 2 hundred subtract 1 hundred equals 1 hundred.** (Use the place values units)

Column Subtraction (with exchanging)	Begin with base 10 or Numicon.		Children should begin with the expanded form.
	Column method (using base 10 and having to exchange) 45-26 1) Start by partitioning 45 2) Exchange one ten for ten more ones 3) Subtract the ones, then the tens. Move to pv counters, modelling the exchange of a ten into ten ones. Start by making the minuend on the place value grid (children need access to these). Then, begin at the ones, it isn't possible to subtract 9 ones from 5 ones so an exchange is needed from the tens column. Continue with the rest of the subtraction encouraging the use of mathematical language.	45 -29 16 When confident, children can find their own way to record the exchange/regrouping	$836-254=582$ Moving onto a more formal way as below. $728-582=146$ Model correct language use: *8 ones subtract 2 ones equals 6 ones. 2 tens subtract 8 tens can't be subtracted yet, we need to exchange 1 hundred for 10 tens in the tens column, now we have 12 tens and the hundreds column now has 6 hundreds. 12 tens subtract 8 tens equals 4 tens. 6 hundreds subtract 5 hundreds equals 1 hundred.*
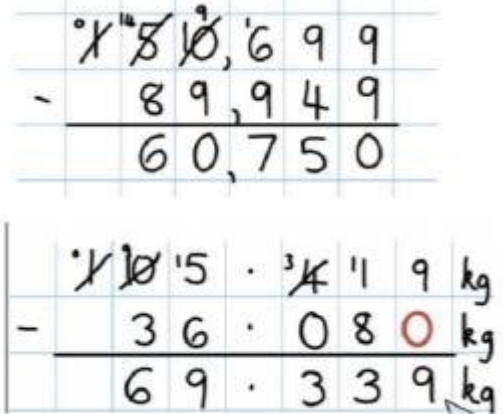
Subtraction- Year 4

Vocabulary: minuend, subtrahend, difference, equals, to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, thousands, hundreds, tens, ones, tenths, hundredths.

Objective and Strategy	Concrete	Pictorial	Abstract
Subtract numbers with up to 4 digits using the formal written methods appropriate of columnar subtraction where appropriate Year 4 subtraction with up to 4 digits.	Model process of exchange using Numicon, base ten and then move to PV counters. The calculation will be shown alongside the model chosen to see the connection 	Model	Calculation
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			Children to draw pv counters and show their exchange—see Y3 The calculation will be shown alongside the model chosen to see the connection. | Model	Calculation
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			H T O . Tths $-\ 2\ \cancel{5}^{4}\ 5\ .\ 3$ $\ \ \ 1\ 1\ 9\ .\ 2$ $\ \ \ 1\ 3\ 6\ .\ 1$ This will lead to an understanding of subtracting any number including decimals.
Introduce decimal subtraction including the context of money.	Children to be encouraged to use counters to represent numbers and take counters away to subtract. **0.42 – 0.3 = _____** Ones | Tenths | Hundredths	52.7 - 27.9 tens | ones | tenths When confident, children can find their own way to record the exchange/ regrouping. Tommy has £1 and 72p. Rosie has £2 How much more money does Rosie have than Tommy? 8p | 20p £1 and 72p £1 and 80p £2 Number lines can be used.	T O .Tths Hths $-\ £\ \cancel{5}^{4}\ \cancel{5}^{14}\ .\ \cancel{3}^{1}\ 1$ $\ \ £\ 1\ 9\ .\ 5\ 0$ $\ \ £\ 3\ 5\ .\ 8\ 1$ Subtracting money using column subtraction. Make sure children have a strong understanding of PV and decimal point.

Subtraction- Year 5/6

Vocabulary: minuend, subtrahend, difference, equals, to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is...difference, count on, strategy, partition, millions, hundred thousands, ten thousands, thousands, hundreds, tens, ones, tenths, hundredths, thousandths

Objective and Strategy	Concrete	Pictorial	Abstract
Subtract with at least 4 digits, including money and measures. Subtract with increasingly large and more complex numbers and decimal values (up to 3 decimal place).	See Year 4	See Year 4	

$$8 \times 5 = 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 40$$

8 times

| 8 | × | 5 | = | 40 |

Multiplier   Multiplicand   Product
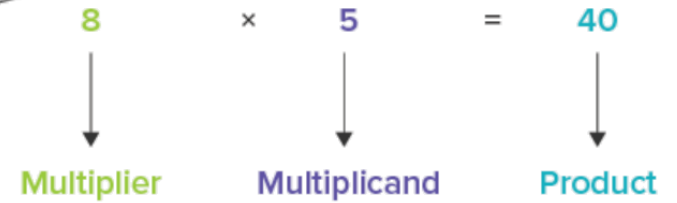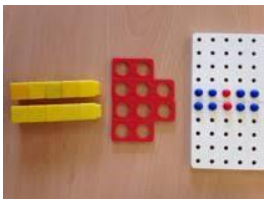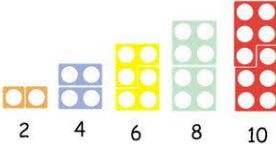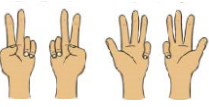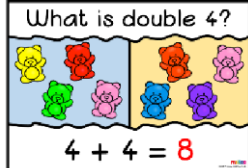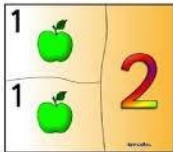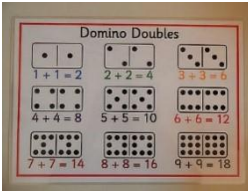
Multiplication

Multiplication-EYFS

Vocabulary: groups of, lots of, times, array, altogether, multiply, multiplier, multiplicand, product, repeated addition

Objectives	Concrete	Pictorial	Abstract
Solve problems including doubling.	Counting and other maths resources for children to make 2 equal groups.	Pictures and icons that encourage children to see concept of doubling as adding two equal groups.	Addition calculations to model adding two equal groups.
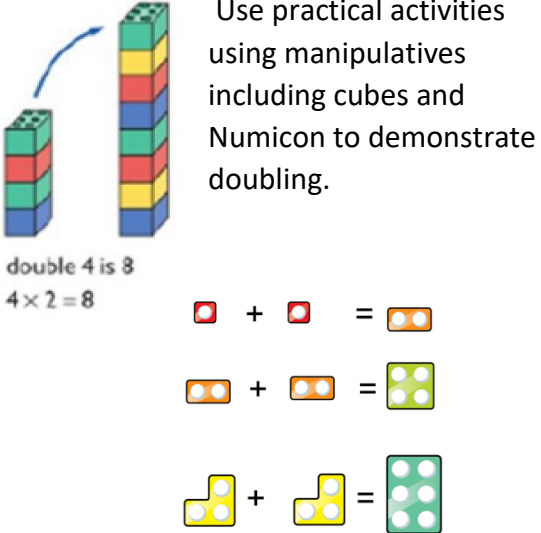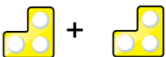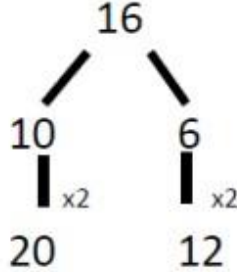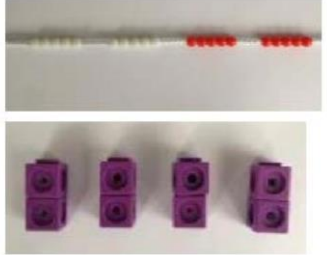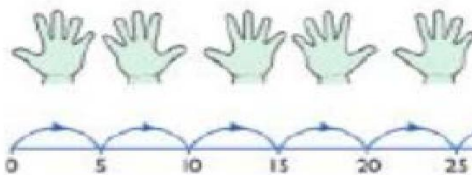
	Physical and real life examples that encourage children to see concept of doubling as adding two equal groups. Show the addition calculation alongside.		
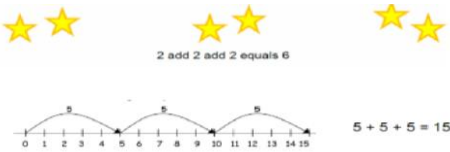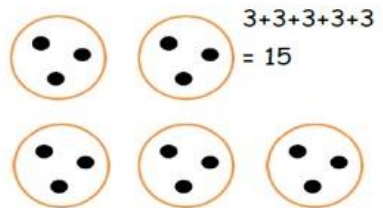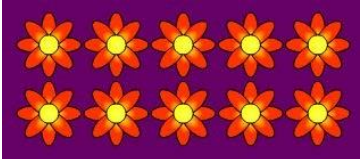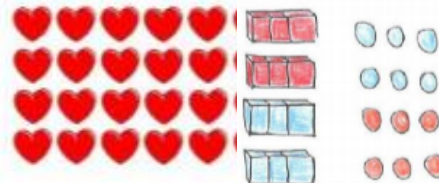
Multiplication- Year 1
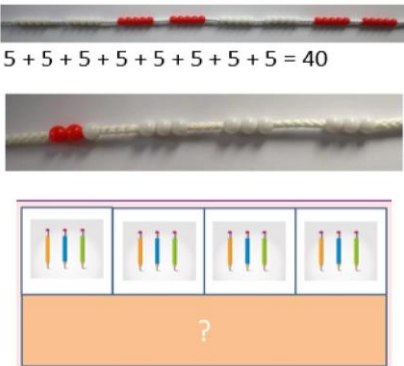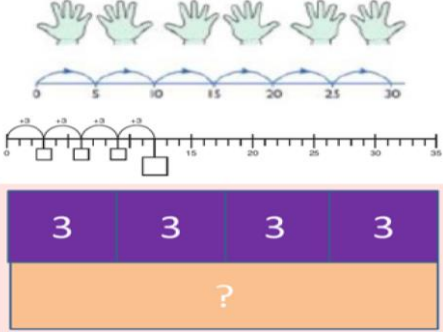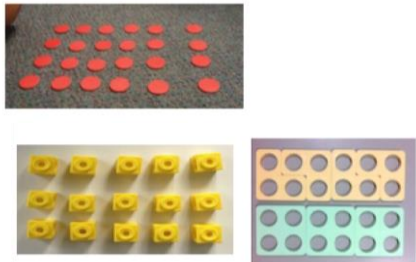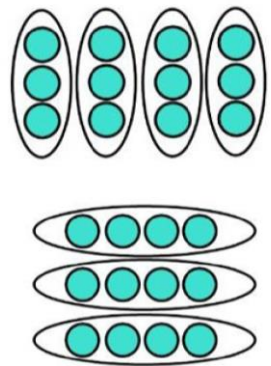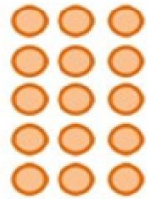
Vocabulary: groups of, lots of, times, array, altogether, multiply, multiplier, multiplicand, product, repeated addition

Objective and Strategy	Concrete	Pictorial	Abstract
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling.	Draw pictures to show how to double numbers. Double 4 is 8	Partition a number and hen double each part before recombing it back together. 16 / 10 / 6 / x2 / x2 / 20 / 12
Counting in multiples	Count in multiples supported by concrete objects and equal groups.	Use a number line or picture to continue support in counting in multiples.	Count in multiples of a number aloud. For counting in twos, you may even begin by whispering the odds and shouting evens. Write sequence with multiples of numbers. **2, 4, 6, 8, 10** **5, 10, 15, 20, 25, 30** You can continue to support children by having a pictorial or concrete, only move on when children are ready.

Repeated addition	Use different objects to add equal groups.	Use objects and number sentence 2 add 2 add 2 equals 6 5 + 5 + 5 = 15 alongside a number line. 3+3+3+3+3 = 15	Children to write addition sentence alongside pictures. 2 + 2 + 2 + 2 + 2 = 10
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.	Draw a representation of arrays to show understanding.	3 x 2 = 6 2 x 5 = 10 Writing out multiplication sentence alongside arrays. **3 x 2 = 2 + 2 + 2 = 6** Show children how the arrays link to multiplication sentence.

Multiplication- Year 2

Vocabulary: multiplier, multiplicand, product, groups of, lots of, times, array, altogether, multiply, repeated addition, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative.

Objective and Strategy	Concrete	Pictorial	Abstract
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)	Count the groups as children are skip counting, children may use their fingers as they skip counting. Use bar models. 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40 ?	 Number line, counting sticks and bar models should be used to show representations of counting in multiples.	Count in multiples of a number aloud. Write a sequence with multiples of numbers. 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25 , 30 $4 \times 3 = \square$
Multiplication is commutative	Create arrays using counters, cubes, Numicon, animals, ect. Pupils should understand that an array can represent different equation and that, as multiplication is **commutative**, the order of the multiplication doesn't affect the answer.	Use representations of arrays to show different calculations and explore **commutativity.**	Use an array to write multiplication sentences and reinforce repeated addition. **15 = 3 x 5** **15 = 5 + 5 + 5** **15 = 5 x 3** **15 = 3 + 3 + 3 + 3 + 3**

Using the Inverse *This should be taught alongside division, so pupils learn how they work alongside each other.*		 $\square \times \square = \square$ $\square \times \square = \square$ $\square \div \square = \square$ $\square \div \square = \square$	$2 \times 4 = 8$ $4 \times 2 = 8$ $8 \div 2 = 4$ $8 \div 4 = 2$ $8 = 2 \times 4$ $8 = 4 \times 2$ $2 = 8 \div 4$ $4 = 8 \div 2$	Show all 8 related fact family sentences. Show CPA alongside one another.
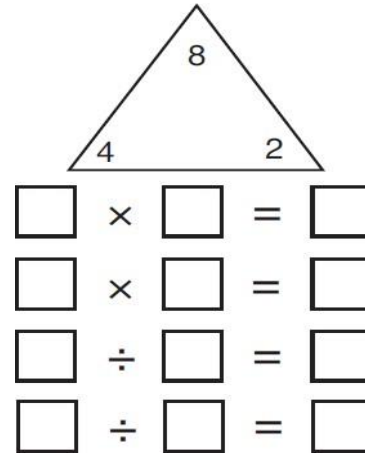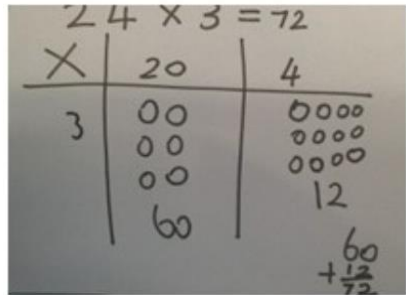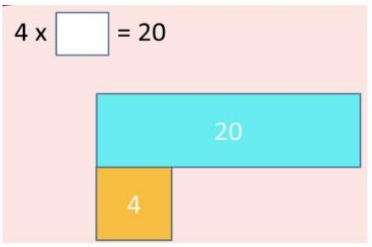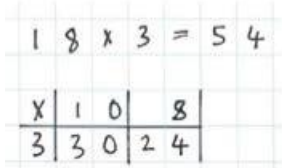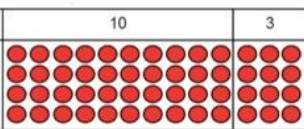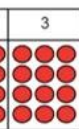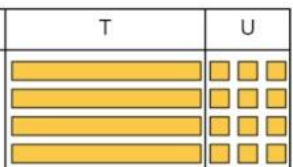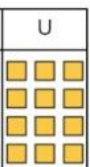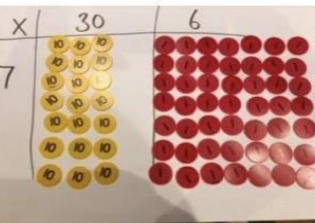
Multiplication- Year 3

Vocabulary: Multiplier, multiplicand, product, groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse

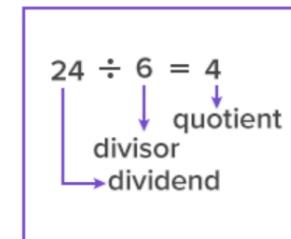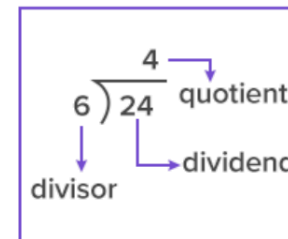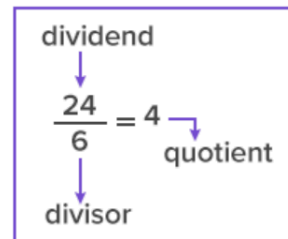| Objective and Strategy	Concrete	Pictorial	Abstract
Multiplying two digit number by a one digit number Area model method progressing to the formal method. Solving problems including missing number problems.	Show the links with arrays to first introduce the grid method. 4 rows od 10 4 rows of 3 Then move on to using Base 10 to move towards a more compact method. 4 rows of 13 Move on to place value counters to show how we are finding groups of a number using the area model. Add up each column, starting with the ones making any exchanges needed. The calculation will be shown alongside the model chosen to see the connection. 	Model	Calculation
---	---
			Children can represent their work with place value counter in a way that they understand. They draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below. Bar models are used to explore missing numbers. 4 x ☐ = 20 	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. $18 \times 3 = 54$ | X	1 0	8
---	---	---
3	3 0	2 4	 Children to add up each column to find the answer. When ready, move on to two digit times by a one digit. TO x O

| One digit multiplied by a two digit moving on to **formal method** including regrouping/ exchanging. | Use concrete object set out as arrays to show multiplication.

Tens / Ones place value chart with counters

Show concrete alongside the calculations to represent the exchanges so children can understand the regrouping.

Hundreds / Tens / Ones chart
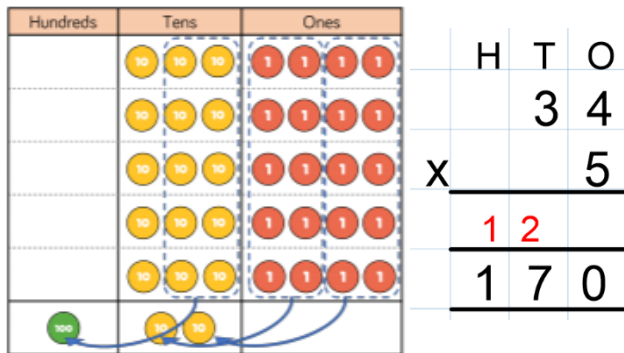
H T O
   3 4
x   5
  1 2
1 7 0 | Children can move on to drawing these representations out. | When children are ready, move on to more formal method of multiplication.
Introduce the exchange row/box when using the formal method.

T O
3 4
x 2

6 8
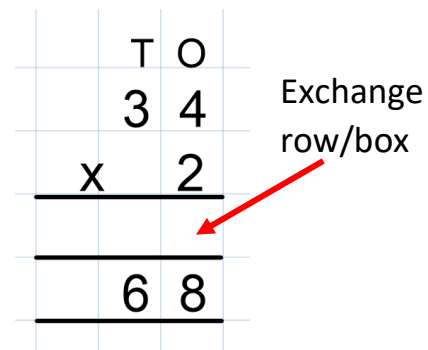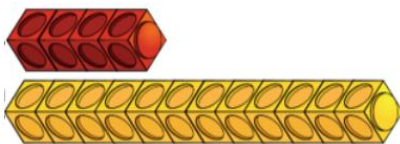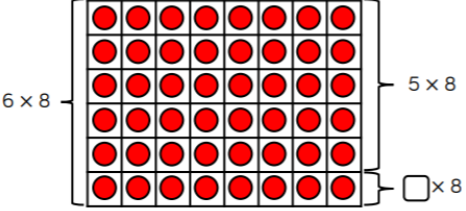
Exchange row/box |
| Scaling | Use cubes, Cuisenaire, counters and Numicon to visually show scaling.
When children have a good understanding relate back to PV counters: a ten counter is ten times greater than a ones counter. | boys
girls
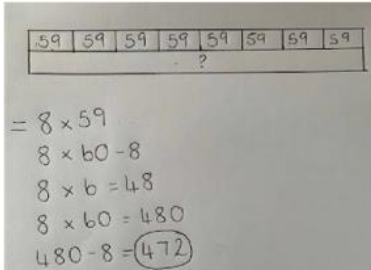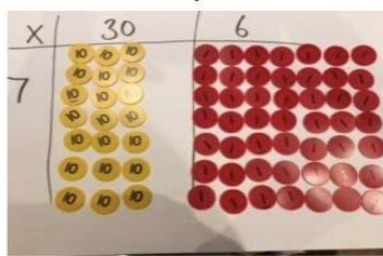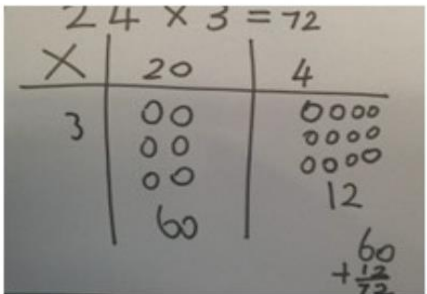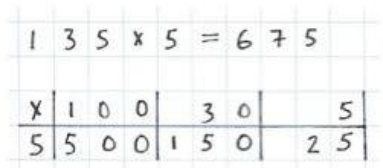
Bar models are used to display scaling to help solve problems. | |

| Using known multiplication facts

Concrete objects aid children to develop conceptual understanding | 5×8
6×8 $\square \times 8$

Use arrays to show how multiplication can be broken down into easier know facts. Use multiplication sentence alongside.

$6 \times 8 \begin{cases} 5 \times 8 = \square \\ \square \times 8 = \square \\ \hline \text{altogether } \square \end{cases}$

Children can used known facts to help them solve multiplication problems.
If they know 3 x 4, they should know 30 x 4 or 3 x 40, as the calculation is time times greater, then the answer should be ten time greater. The array above is a great way to show this. | Children should draw arrays and partition them into known facts. | Children will then begin to break down:

24 x 4
could be partitioned down these ways:

12 x 4 = 48
12 x 4 = 48
altogether = 96

or

20 x 4 = 80
4 x 4 = 16
altogether = 96

or

10 x 4 = 40
10 x 4 = 40
4 x 4 = 16
altogether = 96

Children need to be explicitly shown a variety of ways so they have the understanding and knowledge to do it for themselves. |

Multiplication- Year 4

Vocabulary: Multiplier, multiplicand, product, groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse

Objective and Strategy	Concrete	Pictorial	Abstract
Using known multiplication facts *Lots of work needs to be done before moving on to multiplying 3 digit times 1 digit*	See Year 3	Bar models can support known facts. Children should begin to think about known facts linked to this multiplication. This needs to be explicitly taught. 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 ? = 8 × 59 8 × 60 - 8 8 × 6 = 48 8 × 60 = 480 480 - 8 = (472)	See Year 3
Multiply two digit and three-digit numbers by a one-digit number using formal written layout Grid method recap from year 3 for 2 digits x 1 digit Multiplying numbers by 1 digit (year 4 expectation)	Recap the area model (array). x | 30 | 6 7	Children can represent their work with place value counter in a way that they understand. They can draw the counter using different colours, different amounts, or circles in the different PV columns to show their thinking. 24 × 3 = 72 x | 20 | 4 3 | OO OO OO | OOOO OOOO OOOO | 60 | 12 60 + 12 72	HTO x O 1 3 5 x 5 = 6 7 5 x | 1 0 0 | 3 0 | 5 5 | 5 0 0 | 1 5 0 | 2 5 Children to add up each column to find the answer.

Formal method of column multiplication. *Concrete MUST be understood before moving on.*	Use place value counters to show how we are finding groups of a number. In the place value grid below, we know our multiplier is 4, so we need 4 rows of 126. **4 x 126 =** Each row will be filled with place value counters making up 126. Add up each column starting with the ones and make any exchanges needed. Exchange the 20 ones for 2 tens. Then the 10 tens for 1 hundred. Then, you have your answer. Show calculation alongside	This grid/area model method can be used to help with the expanded column multiplication in the abstract. 	x	100	20	4
5	500	100	20 | Bar modelling and number lines can support children when solving problems with multiplication alongside the formal written methods.	Expanded multiplication allows children to write down each step. $1\ 2\ 4 \times 5 =$ $$\begin{array}{r} 1\ 2\ 4 \\ \times\quad\ 5 \\ \hline 2\ 0 \ (4\times5) \\ 1\ 0\ 0 \ (20\times5) \\ 5\ 0\ 0 \ (100\times5) \\ \hline 6\ 2\ 0 \end{array}$$ When children have shown good understanding using this method, they can move on to the compact method using the exchange row/box. | H	T	O
---	---	---
	1 2 4		 X 5 1 2 6 2 0
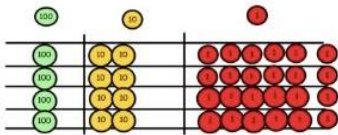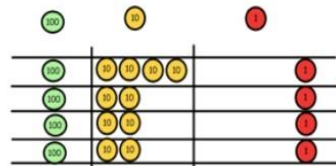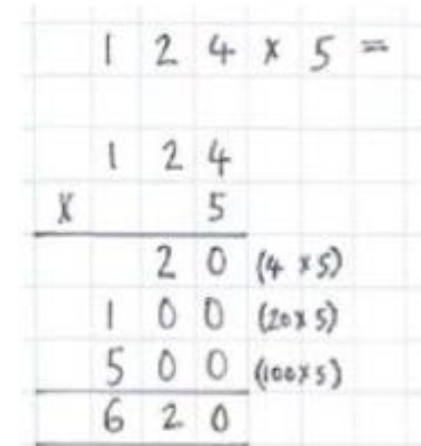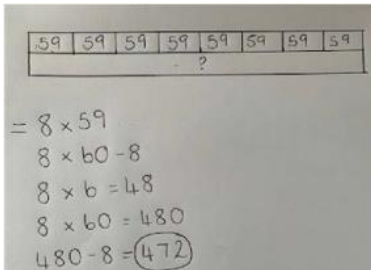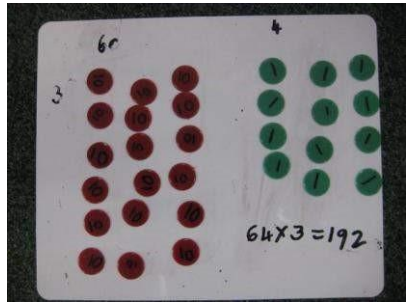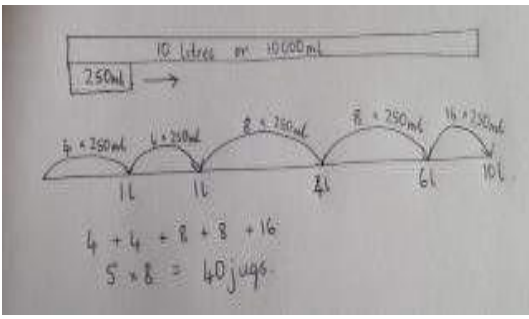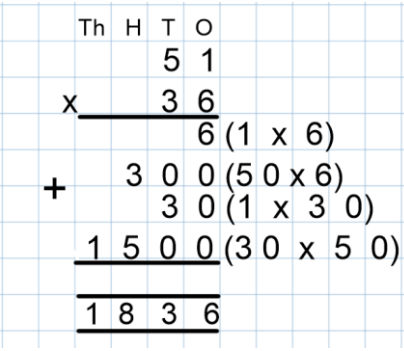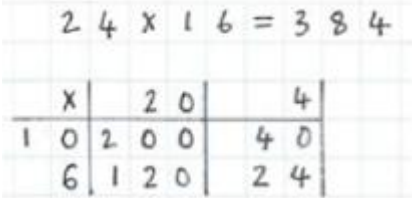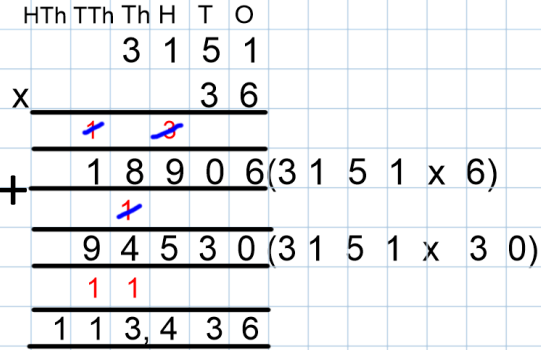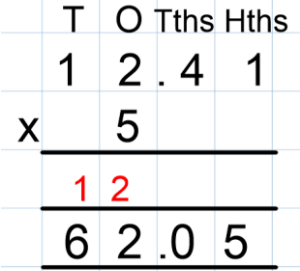
Model	Calculation
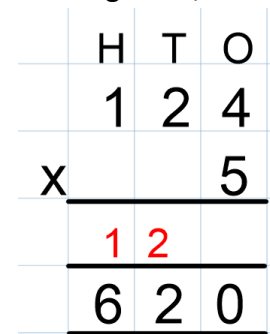
Multiplication- Year 5/6

Vocabulary: Multiplier, multiplicand, product, groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive, factor pairs, composite numbers, prime numbers, factors, squared, cubed

Objective and Strategy	Concrete	Pictorial	Abstract
Using known multiplication facts *Lots of work needs to be done before moving on to multiplying 3 digit times 1 digit*	**See Year 3**	Bar models can support known facts. Children should begin to think about known facts linked to this multiplication. This needs to be explicitly taught. 	**See Year 3**
Long multiplication – Expanded Method including area model.	Children can continue to be supported by place value counters at the stage of multiplication. It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods. 	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out the multiplication next to the answer. This moves to the more compact method.

Long multiplication – compact method	Manipulative should still be used to consolidate PV understanding. The calculation should be modelled alongside.	Area/grid model should be used to help with breaking down the multiplications and PV understanding.	Children move on to compacted method. Multiply the first factor by the ones number and include any exchanges in the exchange box. Then multiply the first factor by the tens number. Include exchanges again.
	<table><tr><td>Model</td><td>Calculation</td></tr><tr><td></td><td></td></tr></table>	$24 \times 16 = 384$ | x	2 0	4
1 0	2 0 0	4 0
6	1 2 0	2 4 | This can be used for more than 2 digit by 2 digit.	HTh TTh Th H T O 　　　　3 1 5 1 x　　　　　3 6 　　　1 8 9 0 6 (3 1 5 1 x 6) +　9 4 5 3 0 (3 1 5 1 x 3 0) 　　　1 1 　1 1 3,4 3 6 Once multiplied, you add the two products up to get the answer. Children should cross our exchanges within the multiplication. They may also write the multiplication next to the answer.
Year 6 Multiply decimal up to 2 decimal places by a single digit.	Use PV counters to help with understanding of exchanging decimals. 	Ones	Tenths
---	---
1 1 1	0.1 0.1
1 1 1	0.1 0.1
1 1 1	0.1 0.1		Children can draw their own representations to show their understanding.	Remind children that the ones digit belongs in the ones column. Line up the decimal point the tenths and hundredths column. 　　T O Tths Hths 　　1 2 . 4 1 x　　　5 　　　1 2 　　6 2 . 0 5

Division

dividend

$$\frac{24}{6} = 4 \rightarrow \text{quotient}$$

divisor

$$6\overline{)24} \quad \text{quotient} \atop \text{dividend}$$

divisor

$$24 \div 6 = 4 \rightarrow \text{quotient}$$
divisor
dividend

Division- EYFS			
Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array			
Objectives and strategy	**Concrete**	**Pictorial**	**Abstract**
Solve problems including: halving and sharing. • Halving a whole, halving a quantity of objects. • Sharing a quantity of objects.	 Children have the opportunity to physically cut objects, food or shapes in half. Counting and other maths resources can be used to share into two equal groups.	 Pictures and icons that encourage children to see concept of halving in relation to subitising, addition and subtraction knowledge. Example: Knowing 4 is made of 2 groups of 2, so half of 4 is 2. 	Use part part whole and bar model representation to show the equal groups. | 2	2
4	
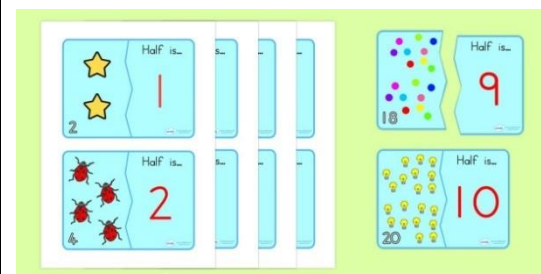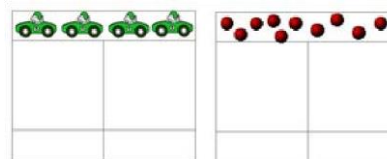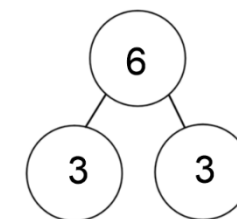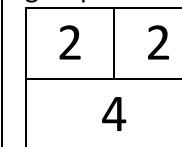
Use visual supports such as haling maths and part part whole, with the physical objects and resources that can be manipulated.
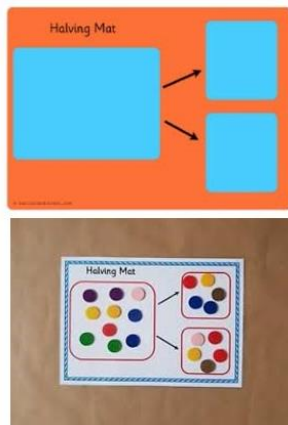
Counting and other resources for children to explore, they can share between 3 or more.

Bar model with pictures or icons to support understanding of finding 2 equal parts of a number, to further understand how two halves make a whole.
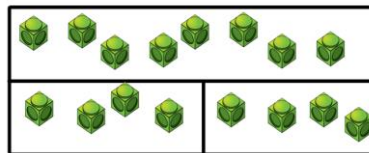
Pictures for children to create and visualise 3 or more equal groups.
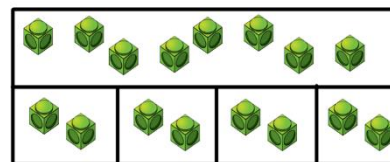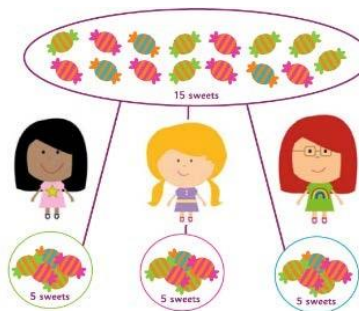
Division- Year 1

Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide

Objectives and strategy	Concrete	Pictorial	Abstract
Division as sharing (sharing objects into groups)	Use practical objects to share into equal groups. These could be mathematical object or non.	Children use pictures or shapes to share quantities. $8 \div 2 = 4$ Children use bar models to show and support understanding. **$8 \div 4 = 2$** Sharing: **12 shared between 3 is 4**	Introduce the division symbol. **$12 \div 4 = 3$** Continue to use bar model to show division. | 9 | | 3 | 3 | 3 |
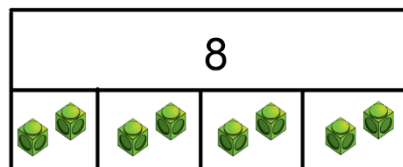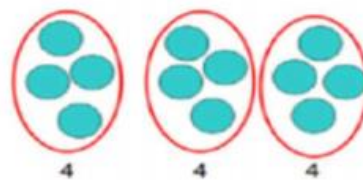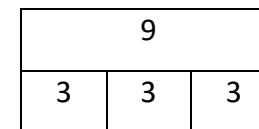
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counter to aid understanding.	Use number lines for grouping. $12 \div 3 = 4$ Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. $20 \div 5 = ?$ $5 \times ? = 20$	$28 \div 7 = 4$ Divide 28 into 7 groups. How many are in each group?
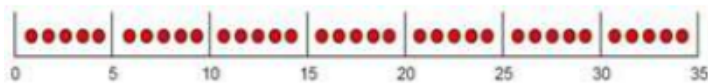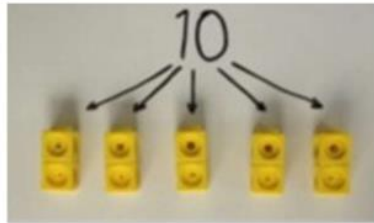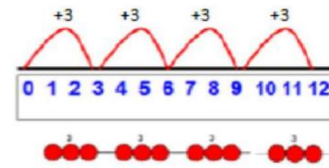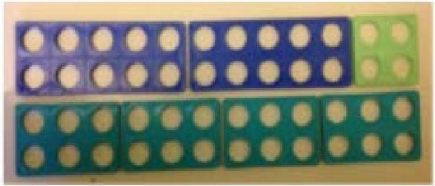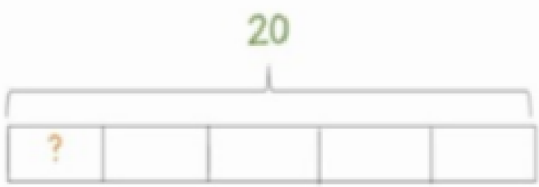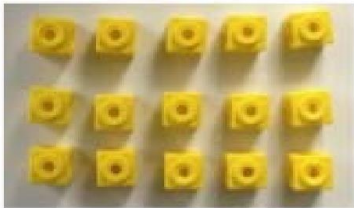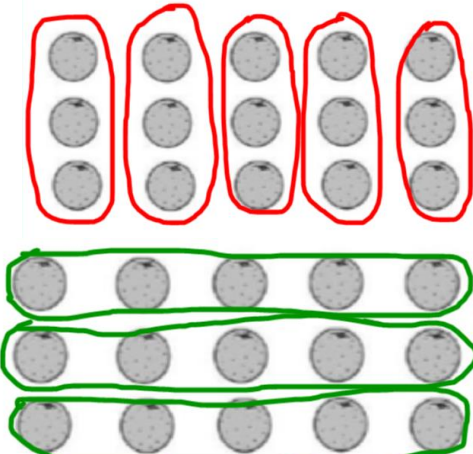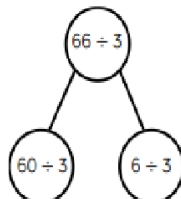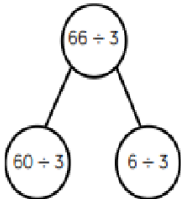
Division- Year 2			
Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over			
Objective and Strategy	**Concrete**	**Pictorial**	**Abstract**
Division as sharing (sharing objects into groups)	**See Year 1**	**See Year 1**	**See Year 1**
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value to aid understanding. 96 ÷ 3 = 32	Use a number line to show the jumps in groups. The number of jumps equals the number of groups. Think of the bar as a whole. Split the into the number of groups you are dividing by and work out how many would be within each group. 20 ÷ 5 = ? 5 x ? = 20	$28 \div 7 = 4$ Divide the 28 into 7 groups.

28						
4	4	4	4	4	4	4

Division- Year 3			
Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, remainder			
Objective and Strategy	**Concrete**	**Pictorial**	**Abstract**
Division as grouping	Use cubes, counters, objects or place value counters to aid understanding. Make 24 using the numicon, underneath group them in groups of 6. 24 divided into groups of 6 = 4 $96 \div 3 = 32$ Using place value counters, 96 divided into groups of 3 = 32	Use bar modelling to aid solving division problems. $20 \div 5 = ?$ $5 \times ? = 20$	How many groups of 6 in 24? $24 \div 6 = 4$

Division with arrays	Link division to multiplication by creating an array. Create number sentences that can be created. $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	Draw arrays and use lines to split the array into groups to make both multiplication and division sentences	Find the inverse of multiplication and division sentence by creating eight linking number sentences. $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 4 = 7$ $28 \div 7 = 4$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$
Divide 2digit numbers by a 1digit number by partitioning into tens and ones using a place value grid.	Use place value grid to support dividing 2 digit by 1 digit. Use Place value counters or Base Ten Share the tens out first then the one (will help with exchanging later on) Using a part part whole model to partition the dividend into known facts.	Part-part whole model to support division. Use draw out place value grid.	

Divide numbers that involve exchanging between the tens and ones. **NO REMAINDERS YET**	Share the tens first and exchange the remaining tens for the ones. Then share the ones. $42 \div 3 = 14$	Use part-part whole model to use known facts – teach this explicitly. Children may use pictorial representation for the place value counters, alongside the part-whole model. Children use their times-tables to partition the number into multiples of the divisor. Jack is dividing 84 by 4 using place value counters. First, he divides the tens. Then, he divides the ones.	$96 \div 8$ $96 \div 4$ $96 \div 3$ $96 \div 6$ Compare the statements using <, > or = $48 \div 4 \bigcirc 36 \div 3$ $52 \div 4 \bigcirc 42 \div 3$ $60 \div 3 \bigcirc 60 \div 4$
Division with a remainder	$14 \div 3 =$ Divide objects between groups and see how much is left over.	Jump forward in equal jumps on a number line then see how many more you need to jump to find the remainder. Draw dots/circles and group them to divide an amount and clearly show the remainder (only efficient with a lower number).	Complete written division and show the remainder using r. $29 \div 8 = 3$ REMAINDER 5 dividend divisor quotient remainder

Moving on to using place value grid.

Use place value counters to work out 94 ÷ 4
Did you need to exchange any tens for ones?
Is there a remainder?
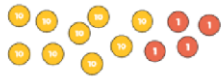
Tens	Ones

29

Place Value Grid			Calculation
Hundreds	Tens	Ones	
			94 ÷ 4 =23 r2
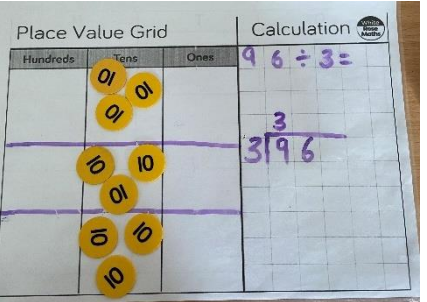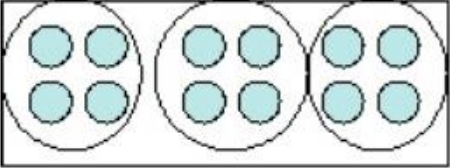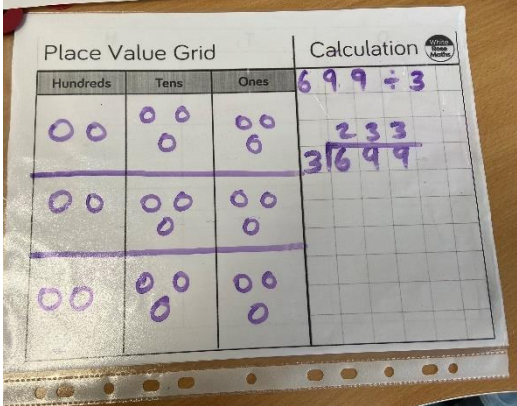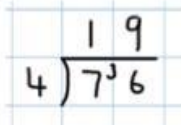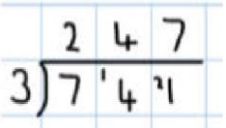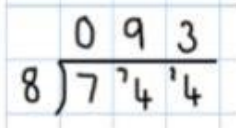
Bar models to show the division with remainders – refer to equal groups and not equal group (remainder).

37			
10	10	10	7
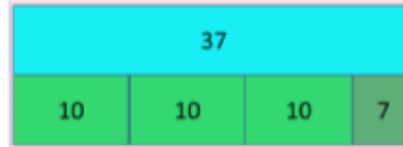
Division- Year 4

Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, remainder, division facts, inverse, derive.

Objective and Strategy	Concrete	Pictorial	Abstract
Divide up to 3 digit number by 1 digit number. Short division – no remainders (NOT BUS STOP)	$96 \div 3$ Use the place value counters to divide using the place value grid and the short division alongside. Start by sharing the highest value place value counter. Once shared look at one group on the PV grid and see there is 3 tens on each group so 9 tens divided by 3 is 3 tens – write the 3 (tens) above the 9 (tens). 	Draw diagrams with dots and circles to help divide into equal groups. Encourage children to count in multiplies for efficiency. Draw place value grid with drawings to represent counters or Base Ten. 	Begin with divisions that divide equally with no remainder. Children should be aware that a 0 is used to keep place value, if the number is not divisible.

Share the ones – 6 ones divided by 3 is 2 ones. Write 2 (ones) above the 6 (ones) in the short division method.
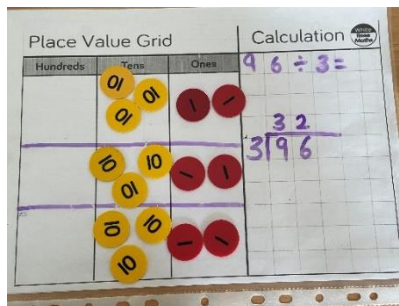
<u>With an exchange</u>

Again, start with highest value PV counters, share them out equally (count in multiples). One ten is left over.
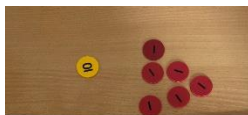
Exchange the 1 ten for 10 ones.
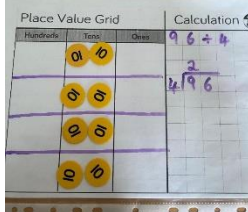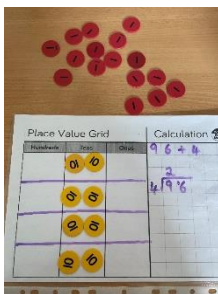
	Share the ones amongst the groups. 		
Divide up to 3 digit number by 1 digit number. Short division – remainder (NOT BUS STOP)	Use either place value counters or Base Ten to represent the division. Complete short division alongside. Share our tens first and exchange the 1 ten left over to 10 ones. Share the ones out equally, identify if any are remaining represent that with a small 'r' next to the quotient.	Draw out representataion pictorially with the short division alongside. 	Divide using short division when children are confident and ready. `
Division using part-part whole method	Use the place value grid to help partition the numbers. 	$84 \div 9 = 9r3$ 6 + 3r3 = 9r3 Use known division facts to divide.	
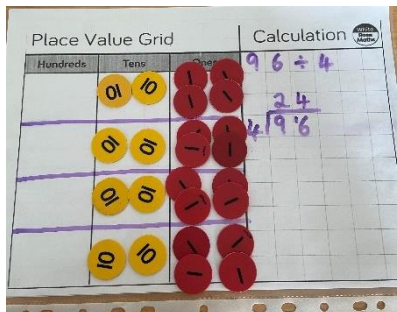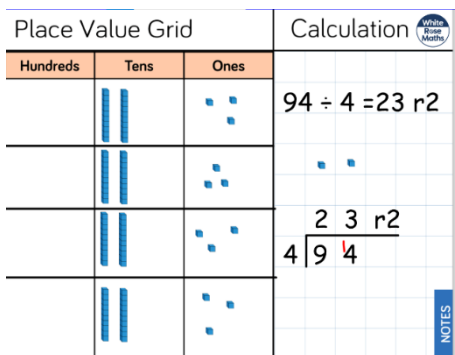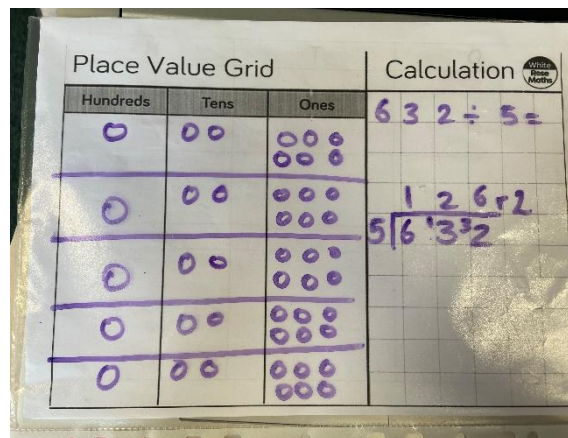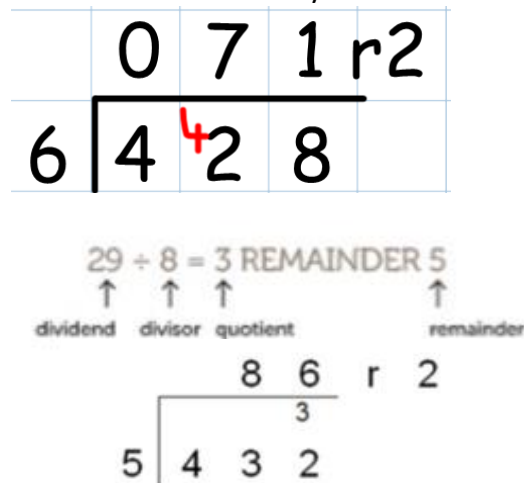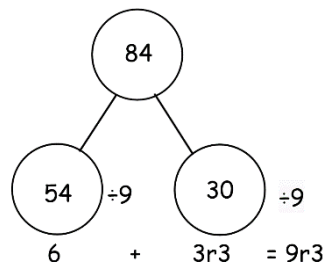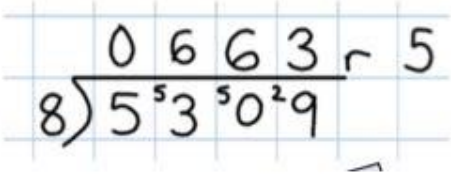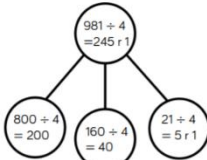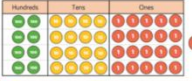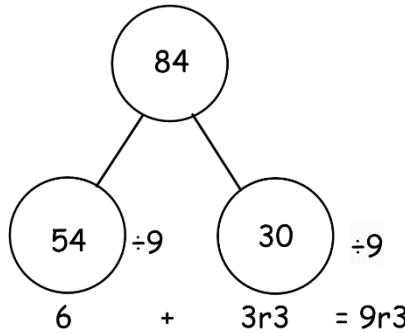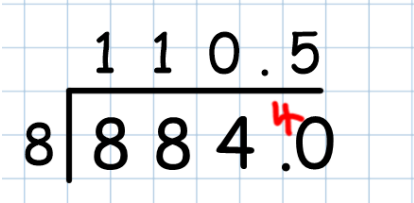
Division- Year 5			
Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, remainder, division facts, inverse, derive, short division			
Objective and Strategy	**Concrete**	**Pictorial**	**Abstract**
Divide by at least 4 digit numbers and interpret remainders.	**See Year 4 for concrete**	**See Year 4 for pictorial**	
Division using part-part whole method	Use the place value grid to help partition the numbers.	84 ÷ 9 = 9r3	

Division- Year 6

Vocabulary: dividend, divisor, quotient, share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, remainder, division facts, inverse, derive, short division, long division

Objective and Strategy	Concrete	Pictorial	Abstract
Short division	**See Year 4/5**	**See Year 4/5**	**See Year 4/5**
Short division – finding fractions or decimals			$884 \div 8 = 110.5$ or $884 \div 8 = 110\ \frac{1}{2}$
	Abstract		
Long division			Write the 15 times tables down: 15 45 30 60 75 90 105 120 135

Long division

432 ÷ 15 becomes

```
      2  8  r 12
 1 5│ 4  3  2
      3  0  0
      1  3  2
      1  2  0
         1  2
```

Answer: 28 remainder 12

432 ÷ 15 becomes

```
      2  8
 1 5│ 4  3  2
      3  0  0   15×20
      1  3  2
      1  2  0   15×8
         1  2
```

$\frac{12}{15} = \frac{4}{5}$

Answer: 28 $\frac{4}{5}$

432 ÷ 15 becomes

```
      2  8 · 8
 1 5│ 4  3  2 · 0
      3  0  ↓
      1  3  2
      1  2  0
         1  2  0
         1  2  0
      ──────────
               0
```

Answer: 28·8

Long division with no remainders	**Step by Step**		

1. Write the multiples of the divisor	2. Divide and multiply	3. Subtract
4,320 ÷ 32 `32 64 96 128 160 192` Write the multiples of the divisor.	Look at the first two digits of the number, divide 4,320 ÷ 32 `32 64 96 128 160 192` 43 (hundreds) by 32. Write closest multiple (cannot be greater than the dividend number) underneath the 43 hundreds. As it goes in '1' time, the 1 begins the first digit of the quotient.	4,320 ÷ 32 `32 64 96 128 160 192` Subtract 32 (hundreds) from 42 (hundreds) equals 11.

4. Drop down the next digit	5. Divide and multiply	6. Subtract
4,320 ÷ 32 `32 64 96 128 160 192` Draw an arrow and drop down the digit.	4,320 ÷ 32 `32 64 96 128 160 192` Divide 112 tens by 32. Look at the multiples, 96 tens is the closest multiple, write it underneath the 112 tens, be careful with place value. As it goes in 3 times, write the 3 to the right of the 1 as the next quotient digit.	4,320 ÷ 32 `32 64 96 128 160 192` Subtract 96 tens from 112 tens (ensure exchanges if needed).

7. Drop down the next digit	8. Divide and multiply	9. Subtract
4,320 ÷ 32 `32 64 96 128 160 192` Draw an arrow and drop down the next digit.	4,320 ÷ 32 `32 64 96 128 160 192` Divide 160 by 32. Look at the multiples, 160 is exactly divided by 32 = 5. As it goes in 5 times, this	4,320 ÷ 32 `32 64 96 128 160 192` Subtract 160 from 160 = 0. 4,320 ÷ 32 = 135

Long division with remainder	**Step by Step**

1. Write the multiples of the divisor	2. Divide and multiply	3. Subtract
4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 Write the multiples of the divisor.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 32 | 4 | 3 | 2 | 0 − | 3 | 2 Look at the first two digits of the number, divide 43 (hundreds) by 32. Write closest multiple (cannot be greater than the dividend number) underneath the 43. As it goes in '1' time, the 1 begins the first digit of the quotient.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 Subtract 32 (hundreds) from 42 (hundreds) equals 11.

4. Drop down the next digit	5. Divide and multiply	6. Subtract
4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 Draw an arrow and drop down the digit.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 | 3 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 − | 9 | 6 Divide 112 by 32. Look at the multiples, 96 is the closest multiple, write it underneath the 112, be careful with place value. As it goes in 3 times, write the 3 to the right of the 1 as the next quotient digit.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 | 3 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 − | 9 | 6 | 1 | 6 Subtract 96 from 112 (ensure exchanges if needed).

7. Drop down the next digit	8. Divide and multiply	9. Subtract
4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 | 3 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 − | 9 | 6 | 1 | 6 | 0 Draw an arrow and drop down the next digit.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 | 3 | 5 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 − | 9 | 6 | 1 | 6 | 0 | 1 | 6 | 0 Divide 160 by 32. Look at the multiples, 160 is exactly divided by 32 = 5. As it goes in 5 times, this is the last whole digit of the quotient number.	4,320 ÷ 32 32 | 64 | 96 | 128 | 160 | 192 1 | 3 | 5 32 | 4 | 3 | 2 | 0 − | 3 | 2 | 1 | 1 | 2 − | 9 | 6 | 1 | 6 | 0 − | 1 | 6 | 0 | 0 Subtract 160 from 160 = 0. 4,320 ÷ 32 = 135

Long division – decimal answer	**Step by step**	

1. Write the multiples of the divisor

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

Write the multiples of the divisor.

2. Divide and multiply

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1
16 | 2  6  4 .
     1  6
```

Look at the first two digits of the number, divide 26 (tens) by 16. Write closest multiple (cannot be greater than the dividend number) underneath the 26. As it goes in '1' time, the 1 begins the first digit of the quotient.

3. Subtract

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1
16 | 2  6  4 .
   - 1  6
     1  0
```

Subtract 26 (tens) from 16 (tens) equals 10.

4. Drop down the next digit

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1
16 | 2  6  4 .
   - 1  6
     1  0  4
```

Draw an arrow and drop down the digit.

5. Divide and multiply

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1  4 .
16 | 2  6  4 .
   - 1  6
     1  0  4
   -    9  6
```

Divide 104 by 16. Look at the multiples, 112 is the closest multiple, write it underneath the 16, be careful with place value. As it goes in 4 times, write the 4 to the right of the 1 as the next quotient digit.

6. Subtract

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1  4 .
16 | 2  6  4 .
   - 1  6
     1  0  4
   -    9  6
           8
```

Subtract 96 from 104 (ensure exchanges if needed).

7. Drop down the next digit

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1  4 .
16 | 2  6  4 . 0
   - 1  6
     1  0  4
   -    9  6
           8  0
```

To the right of the dividend number put a decimal point and a 0 in the tenths column. Draw an arrow and drop down the 0 digit.

8. Divide and multiply

218 ÷ 16 =

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1  4 . 5
16 | 2  6  4 . 0
   - 1  6
     1  0  4
   -    9  6
           8  0
           8  0
```

Divide 80 by 16. Look at the multiples, 80 is exactly divided by 16 = 5. As it goes in 5 times, this is the tenth digit of the quotient number.

9. Subtract

218 ÷ 16 = 14.5

| 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 |

```
        1  4 . 5
16 | 2  6  4 . 0
   - 1  6
     1  0  4
   -    9  6
           8  0
   -       8  0
              0
```

Subtract 80 from 80 = 0.
218 ÷ 16 = 14.5