St. Mary's Catholic Voluntary Academy

Mastery Calculation Policy

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At the centre of St. Mary's mastery approach to teaching mathematics is our belief that all pupils have the potential to succeed. Developing a positive mathematical mind-set in every child enables them to pro-actively take ownership of their learning. Through varied practice, we develop their conceptual understanding of key mathematical concepts and then deepen their understanding by planning opportunities for them to reason and apply their learning when solving problems. The children are taught to 'see' and understand the maths with concrete resources, pictorial representations and abstract calculations. All this enhances their ability to make connections with their wider mathematical thinking, to make connections with the rest of their curriculum and eventually to make connections to the wider world around them.

Our curriculum has been developed around three core interconnect mathematical ideas:
- Fluency
- Reasoning
- Problem Solving

Children's learning is developed to allow them to make rich and lasting connections across these three principles. It allows them to challenge their understanding, talk about their mathematical thinking and apply their knowledge in a variety of context (inc cross curricular use).
In addition to our three core ideas, our key teaching values are:
- To inspire and engage children
- To allow all children the opportunity to access their learning
- To develop a positive mind-set towards mathematics

This mathematics policy is a guide for all staff at St. Mary's CVA and has been adapted from work by White Rose Maths Hub and NCETM. It is purposely set out as a progression of mathematical skills and not into year group phases to encourage a flexible approach to teaching and learning. It is expected that teachers will use their professional judgement as to when consolidation of existing skills is required or if to move onto the next concept. However, the focus must always remain on breadth and depth rather than accelerating through concepts. Children should not be extended with new learning before they are ready, they should deepen their conceptual understanding by tackling challenging and varied problems.

All teachers have been given the scheme of work from the White Rose Maths Hub and are required to base their planning around their mixed-year groups modules and not to move onto a higher year groups scheme work. Teachers can use any teaching resources that they wish to use and the policy does not recommend one set of resources over another, rather that, a variety of resources are used.

For each of the four rules of number, different strategies are laid out, together with examples of what concrete materials can be used and how, along with suggested pictorial representations. The principle of the concrete-pictorial-abstract (CPA) approach [Make it, Draw it, Write it] is for children to have a true understanding of a mathematical concept, they need to master all three phases within a year group's scheme of work. Specific progression of vocabulary is detailed within the policy along with progression of key skills inline with in the National Curriculum 2014. This is to ensure that teachers have good horizon knowledge of where the children have come from in previous year groups and where they are heading in their next year group.
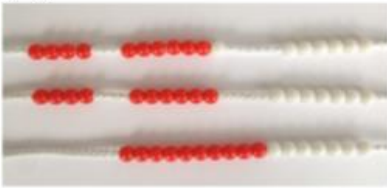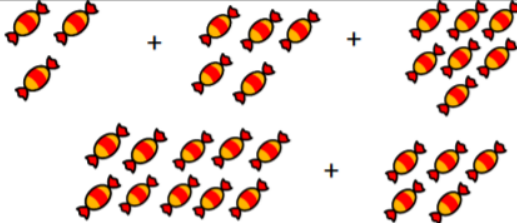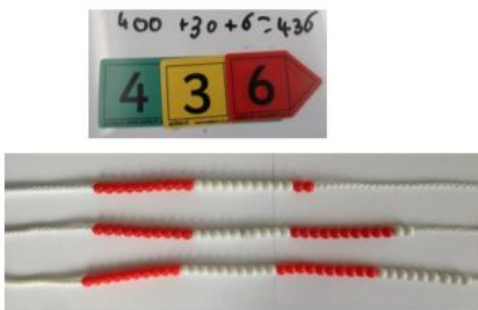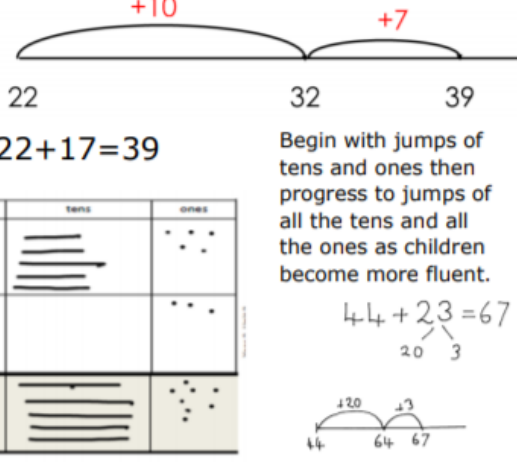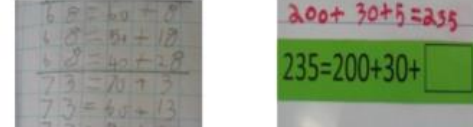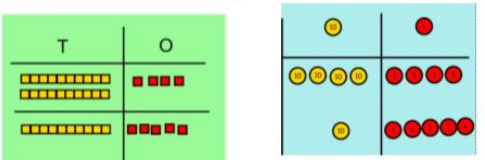
ADDITION

RECEPTION: Before addition can be introduced, children in need to have a secure knowledge of number in order to begin addition. Children are then introduced to the concept of addition through practical games and activities. Children act out addition sums to physically add two groups of objects together and use arm gestures to represent the signs + and =. This is reinforced by opportunities provided in the outdoor area for the children to use addition e.g. adding together groups of building blocks, twigs etc. Children build on their previous knowledge of 'more' by learning that adding two groups of objects together gives them a larger number (more objects). Adults model addition vocabulary supported by age appropriate definition. An example of this is "addition means we add two groups together / we put 2 lots of objects together. Equals means we find out how many we have got altogether. 3 add 2 equals 5! We have got 5 altogether". Adults support children in recording their addition sums in the written form on whiteboards and in their maths books.

ADDITION: KEY VOCABULARY					
Year One	Year Two	Year Three	Year Four	Year Five	Year Six
number bonds; number facts; Addition facts; Fact family; sum; total; whole; parts; plus; add; altogether; more; is equal to; is the same as as many as; Tens, ones; exchange; digit; one more; count on; double; most;	Add; count on; more; Plus; total; sum; partition; bridge; adjust; Inverse; number line; number facts; hundred; tens; ones; tens boundary; whole; parts; altogether; is equal to; is the same as; number bonds; number facts; fact families;	Calculation; calculate; addition; Sum; total; whole; part; column addition; ones; tens; hundreds; exchange/regroup; operation; estimate; inverse; hundreds boundary; increase; expanded; compact	Calculation; calculate; addition; Sum; total; whole; part; column addition; ones; tens; hundreds; thousands; exchange/regroup; operation; estimate; inverse; hundreds boundary; thousand boundary; increase; expanded; compact	Calculation; calculate; addition; Sum; total; whole; part; column addition; ones; tens; hundreds; thousands; exchange/regroup; operation; estimate; inverse; hundreds boundary; thousand boundary; increase; expanded; compact; decimal place; decimal point; tenths; hundredths; thousandths	Calculation; calculate; addition; Sum; total; whole; part; column addition; ones; tens; hundreds; thousands; exchange/regroup; operation; estimate; inverse; hundreds boundary; thousand boundary; increase; expanded; compact; decimal place; decimal point; tenths; hundredths; thousandths

	Concrete	Pictorial	Abstract
Combining two parts to make the whole.	Use cubes to add two numbers together as a group or in a bar.	Use pictures to add two numbers together as a group or in a bar.	Use the part-part whole diagram as shown above to move into the abstract. $4 + 3 = 7$ $10 = 6 + 4$
Counting On	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	$12 + 5 = 17$ Start at the larger number on the number line and count on in ones or in one jump to find the answer.	$5 + 12 = 17$ Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10.	$6 + 5 = 11$ Start with the bigger number and use the smaller number to make 10.	Use pictures or a number line. Regroup or partition the smaller number to make 10. $3 + 9 =$ $9 + 5 = \boxed{14}$	$7 + 4 = 11$ If I am at seven, how many more do I need to make 10. How many more do I add on now?

|			
Adding 3 single 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 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	$4 + 7 + 6 = \boxed{10} + \boxed{7}$ $= \boxed{17}$ Combine the two numbers that make 10 and then add on the remainder.
Partitioning to add.	 $400 + 30 + 6 = 436$ 22+17=39 20 + 10 = 30 2 + 7 = 9 30 + 9 = 39	**+10** **+7** 22 32 39 22+17=39 Begin with jumps of tens and ones then progress to jumps of all the tens and all the ones as children become more fluent. 44 + 23 = 67	$200 + 30 + 5 = 235$ 235=200+30+ **25+48=73** 20 + 5 40 + 8 60 + 13 = 73 Informal recording in columns 56 75 Counting on in tens and ones to solve missing number problems
Column Method – no regrouping	**24 + 15=** Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters. 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. T O	Calculations 21 + 42 = 21 + 42

| Column Method – with regrouping | Make both numbers on a place value grid.

 146
 + 527
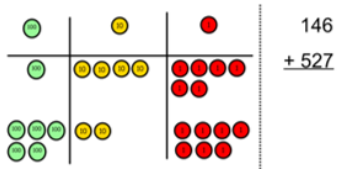
 Add up the units and exchange 10 ones for one 10.

 146
 + 527
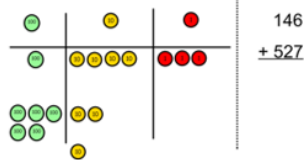
 Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

 This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

 As children move on to decimals, money and decimal place value counters can be used to support learning. | Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.
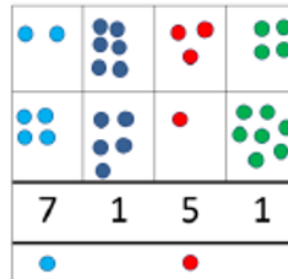
 | Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

 $20 + 5$
 $40 + 8$
 $60 + 13 = 73$

 536
 + 85
 621
 1 1

 As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

 72.8
 + 54.6
 127.4
 1 1

 £ 2 3 . 5 9
 + £ 7 . 5 5
 £ 3 1 . 1 4
 1 1 . 1

 2 3 . 3 6 1
 9 . 0 8 0
 5 9 . 7 7 0
 + 1 . 3 0 0
 9 3 . 5 1 1
 2 1 2 |
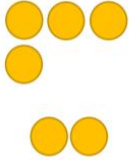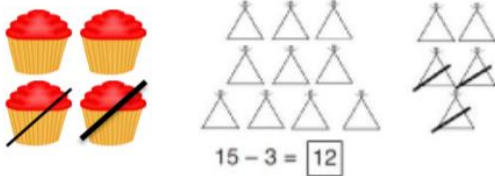
SUBTRACTION

RECEPTION: Before subtraction can be introduced, children need to have a secure knowledge of number in order to begin subtraction. Children are then introduced to the concept of subtraction through practical games and activities. Children act out subtractions 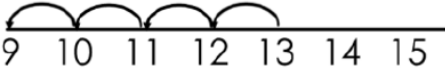to physically subtract a number of objects from a group. Children use arm gestures to represent the signs - and =. This is reinforced by opportunities provided in the outdoor area for the children to count e.g. counting building blocks, twigs etc. Children build on their previous knowledge of 'less' by learning that subtracting means taking away a certain number of objects from a group (leaving them with less objects). Adults model subtraction vocabulary supported by age appropriate definition. An example of this is "subtraction means we take away objects from a group / we have 11 got less objects now. Equals means we find out how many we have got left. Wow! We have only got 3 left!" Adults support children in recording their subtractions in the written form on whiteboards and in their maths books.

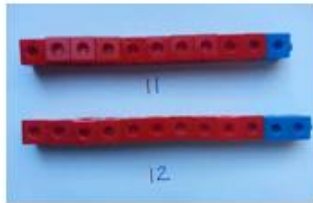| SUBTRACTION: KEY VOCABULARY					
Year One	Year Two	Year Three	Year Four	Year Five	Year Six
Equal to; take; take away; take from; less; minus; subtract; leaves; how many more; how many fewer; less than; most; least; count back; how many left; how much less is..	Equal to; take; take away; take from; less; minus; subtract; leaves; distance between; difference 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	Equal to; take; take away; take from; less; minus; subtract; leaves; distance between; difference 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; taking; decrease; hundreds; value; digit	Equal to; take; take away; take from; less; minus; subtract; leaves; distance between; difference 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; taking; decrease; hundreds; value; digit; inverse; thousand; exchanges; regroup	Equal to; take; take away; take from; less; minus; subtract; leaves; distance between; difference 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; taking; decrease; hundreds; value; digit; inverse; thousand; exchanges; regroup; tenths; hundredths; decimal point; decimal	Equal to; take; take away; take from; less; minus; subtract; leaves; distance between; difference 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; taking; decrease; hundreds; value; digit; inverse; thousand; exchanges; regroup; tenths; hundredths; decimal point; decimal

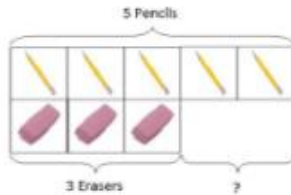|	Concrete	Pictorial	Abstract
Taking away ones.	Use physical objects, counters, cubes etc to show how objects can be taken away. $6 - 2 = 4$	Cross out drawn objects to show what has been taken away. $15 - 3 = \boxed{12}$	$18 - 3 = 15$ $8 - 2 = 6$
Counting back.	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. $13 - 4$ Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track 9 10 11 12 13 14 15 Start at the bigger number and count back the smaller number showing the jumps on the number line. -1 -1 -1 -10 -10 34 35 36 37 47 57 This can progress all the way to counting back using two 2 digit numbers.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

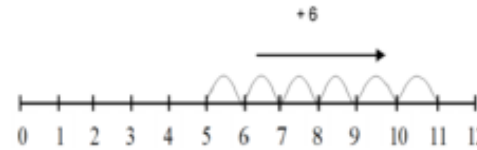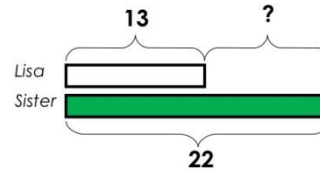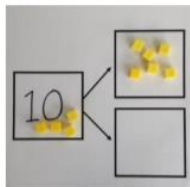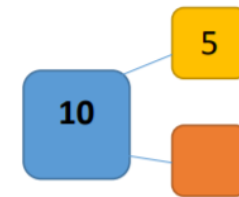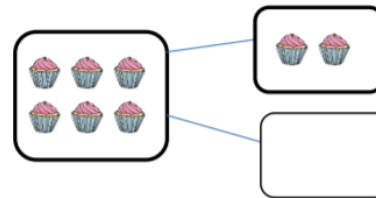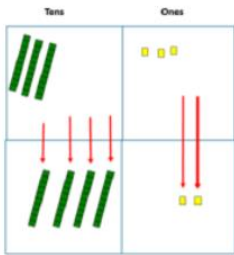| Find the difference	Compare amounts and objects to find the difference. Use cubes to build towers or make bars to find the difference 5 Pencils 3 Erasers ? Use basic bar models with items to find the difference	Count on to find the difference. +6 0 1 2 3 4 5 6 7 8 9 10 11 12 **Comparison Bar Models** Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them. 13 ? Lisa Sister 22 Draw bars to find the difference between 2 numbers.	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.
Part, part, whole.	Link to addition- use the part whole model to help explain the inverse between addition and subtraction. 10 If 10 is the whole and 6 is one of the parts. What is the other part? **10 - 6 =**	Use a pictorial representation of objects to show the part part whole model.	5 10 Move to using numbers within the part whole model.

Making 10	$14 - 9 =$ Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	$13 - 7 = \boxed{6}$ Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	$16 - 8 =$ How many do we take off to reach the next 10? How many do we have left to take off?
Column method – No regrouping	Use Base 10 to make the bigger number then take the smaller number away. Show how you partition numbers to subtract. Again make the larger number first.	Draw the Base 10 or place value counters alongside the written calculation to help to show working.	$47 - 24 = 23$ $$\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$$ This will lead to a clear written column subtraction.
Column method – with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters	Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.	$836 - 254 = 582$
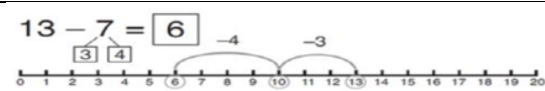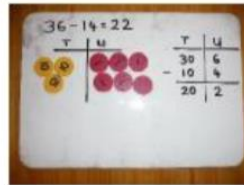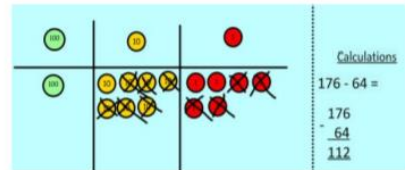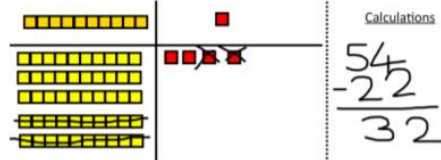
Calculations

234
- 88
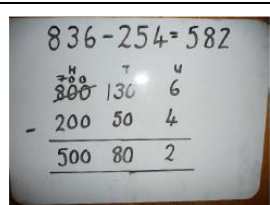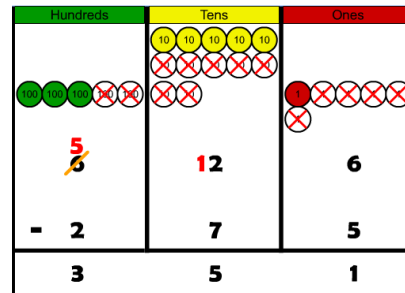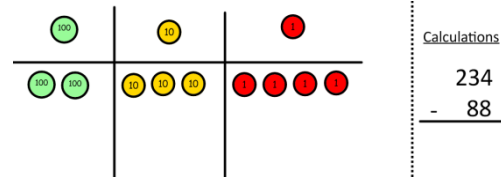
Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.

Calculations

234
- 88
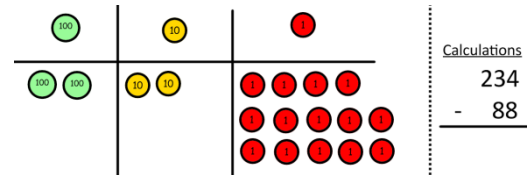
Now I can subtract my ones.

Calculations

234
- 88
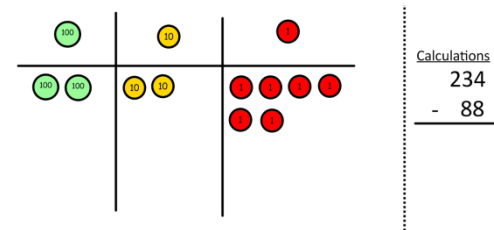
Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.

When confident, children can find their own way to record the exchange/regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.

Children can start their formal written method by partitioning the number into clear place value columns.
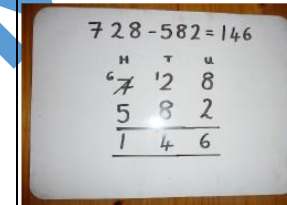
Moving forward the children use a more compact method.

This will lead to an understanding of subtracting any number including decimals.
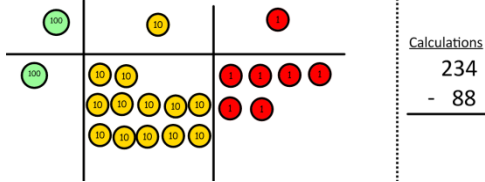
Calculations

$$234 - 88$$

Now I can take away eight tens and complete my subtraction.
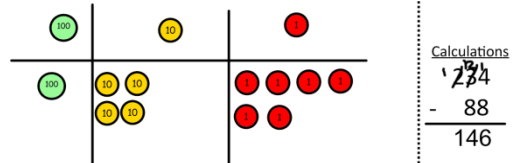
Calculations

$$234 - 88 = 146$$

Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

MULTIPLICATION

RECEPTION: By the end of Reception, children are expected to understand the concept of doubling and to be able to double a number up to 10. Before doubling can be introduced, children need to have a secure knowledge of counting, number facts and addition in order to double. Children are then introduced to the concept of doubling through practical games and activities, including the use of the outdoor areas. Children act out 'doubling' by physically add two equal groups together to find out the 'doubles' answer.

MULTIPLICATION: KEY VOCABULARY					
Year One	Year Two	Year Three	Year Four	Year Five	Year Six
Groups of; lots of; times; array; altogether; multiply; count	Groups of; lots of; times; array; altogether; multiply; count; multiplied by; repeated addition; factor	Groups of; lots of; times; array; altogether; multiply; count; multiplied by; repeated addition; column; row; commutative; sets of; equal groups; times as big as; once, twice, three times..; product; factor; grid method	Groups of; lots of; times; array; altogether; multiply; count; multiplied by; repeated addition; column; row; commutative; sets of; equal groups; times as big as; once, twice, three times..; product; factor; grid method; multiple; tens; ones; value; factor pair; approximate	Groups of; lots of; times; array; altogether; multiply; count; multiplied by; repeated addition; column; row; commutative; sets of; equal groups; times as big as; once, twice, three times..; product; factor; grid method; multiple; tens; ones; value; factor pair; approximate; integer; decimal; short/long multiplication; regroup	Groups of; lots of; times; array; altogether; multiply; count; multiplied by; repeated addition; column; row; commutative; sets of; equal groups; times as big as; once, twice, three times..; product; factor; grid method; multiple; tens; ones; value; factor pair; approximate; integer; decimal; short/long multiplication; regroup; tenths; hundredths

	Concrete	Pictorial	Abstract
Doubling	Use practical activities to show how to double a number. double 4 is 8 $4 \times 2 = 8$	Draw pictures to show how to double a number. Double 4 is 8	Partition a number and then double each part before recombining it back together.
Counting in multiples	Count in multiples supported by concrete objects in equal groups.	Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30

Repeated addition	Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 add 2 add 2 equals 6 5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures. 2 + 2 + 2 + 2 + 2 = 10
Arrays showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.	Draw arrays in different rotations to find **commutative** multiplication sentences. $4 \times 2 = 8$ $2 \times 4 = 8$ $2 \times 4 = 8$ $4 \times 2 = 8$ Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition. 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15
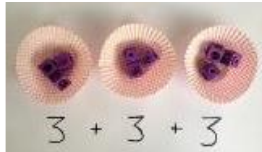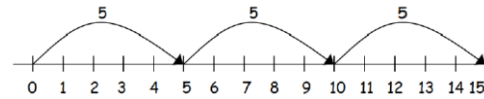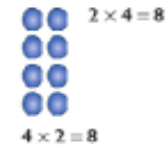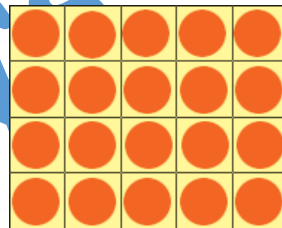
Grid Method

Show the link with arrays to first introduce the grid method.

4 rows of 10
4 rows of 3
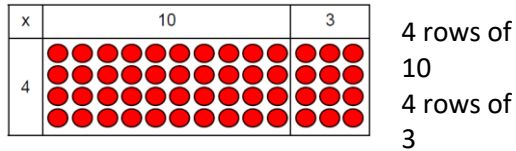
Move on to using Base 10 to move towards a more compact method.

4 rows of 13
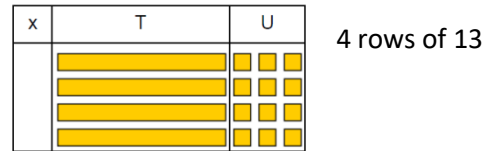
Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.

Calculations
4 x 126
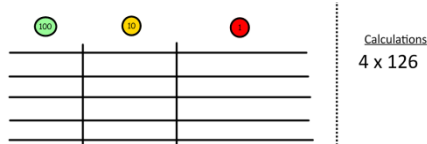
Fill each row with 126.

Calculations
4 x 126
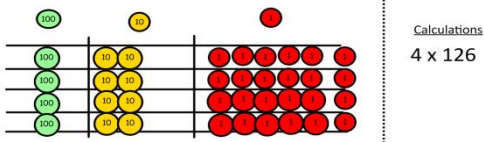
Add up each column, starting with the ones making any exchanges needed.

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.
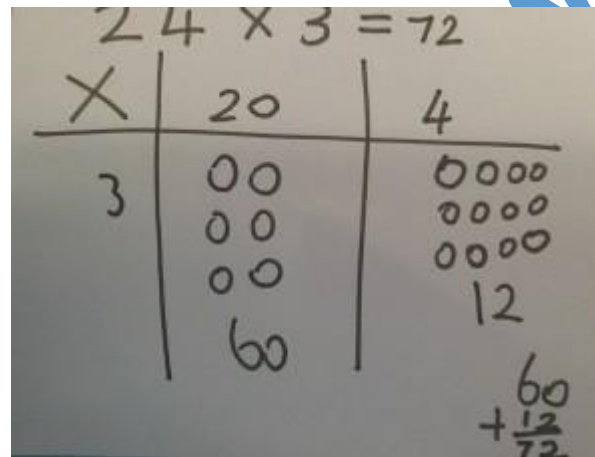
Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

×	30	5
7	210	35

210 + 35 = 245

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.
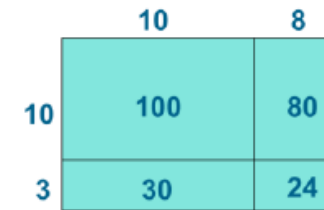
X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16
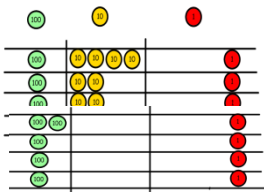
Then you have your answer.

| Column Multiplication | Children can continue to be supported by place value counters at the stage of multiplication.   64×3=192 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 what they are solving next to their answer. 32 x 24 8   (4 x 2) 120   (4 x 30) 40   (20 x 2) 600   (20 x 30) 768 |
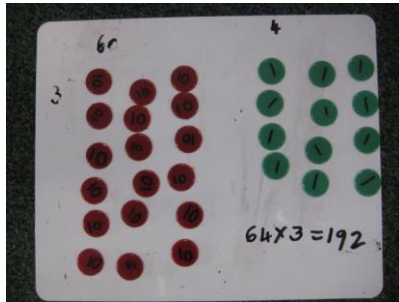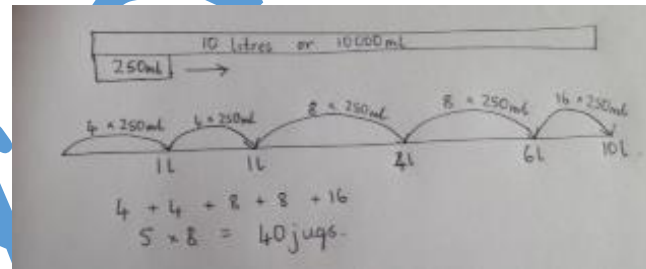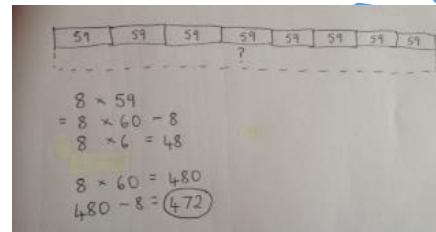
			$$\begin{array}{r} 7\ 4 \\ \times\quad 6\ 3 \\ \hline 1\ 2 \\ 2\ 1\ 0 \\ 2\ 4\ 0 \\ +\ 4\ 2\ 0\ 0 \\ \hline 4\ 6\ 6\ 2 \end{array}$$
			This moves more compact to the method.
			$$\begin{array}{r} {}^{2}\ {}^{3}\ {}^{1} \\ 1\ 3\ 4\ 2 \\ \times\quad 1\ 8 \\ \hline 1\ 3\ 4\ 2\ 0 \\ 1\ 0\ 7\ 3\ 6 \\ \hline 2\ 4\ 1\ 5\ 6 \\ {}_{1} \end{array}$$
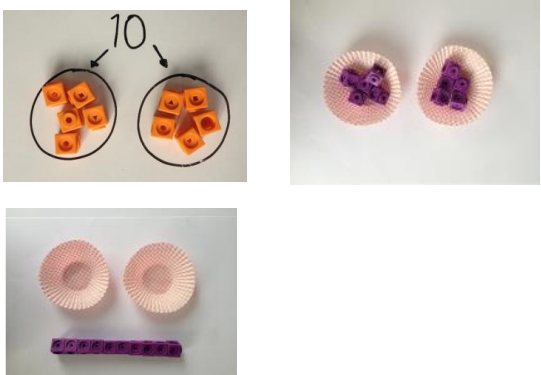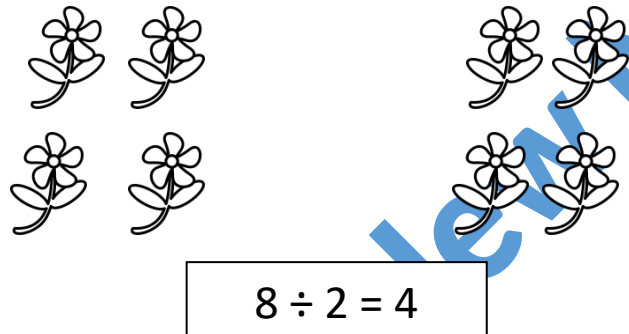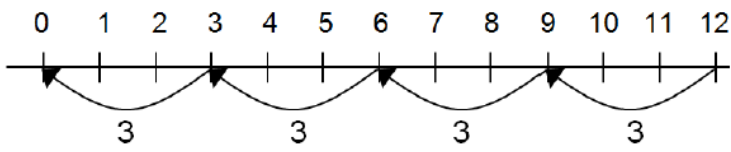
DIVISION

RECEPTION: By the end of Reception, children are expected to understand the concept of halving and sharing. Before this can be introduced, children need to have a secure knowledge of counting backwards, number facts and subtraction in order to halve and share. Children are then introduced to the concept of halving and sharing through practical games and activities. They act out 'halving and sharing' through activities such as sharing food for their Teddy Bear's Picnic, sharing resources equally to play a game. This is reinforced by opportunities provided in the outdoor area for the children to halve and share out objects such as building blocks, twigs etc.

DIVISION: KEY VOCABULARY					
Year One	Year Two	Year Three	Year Four	Year Five	Year Six
share; share equally; one each; two each; groups; groups of; lots of; array	share; share equally; one each; two each; groups; groups of; lots of; array; divide; divided by; divided into; division; grouping; number line;	share; share equally; one each; two each; groups; groups of; lots of; array; divide; divided by; divided into; division; grouping; number line; left; left over	share; share equally; one each; two each; groups; groups of; lots of; array; divide; divided by; divided into; division; grouping; number line; left; left over; inverse; remainder;	share; share equally; one each; two each; groups; groups of; lots of; array; divide; divided by; divided into; division; grouping; number line; left; left over; inverse; remainder; regroup; carry; multiple; short division; divisible by; factor; quotient; prime number; prime factors; composite numbers;	share; share equally; one each; two each; groups; groups of; lots of; array; divide; divided by; divided into; division; grouping; number line; left; left over; inverse; remainder; regroup; carry; multiple; short division; divisible by; factor; quotient; prime number; prime factors; composite numbers; common factors
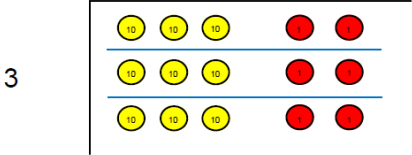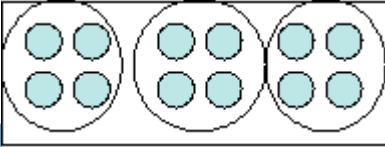
	Concrete	Pictorial	Abstract
Sharing objects into groups	I have 10 cubes, can you share them equally in 2 groups	Children use pictures or shapes to share quantities. $$8 ÷ 2 = 4$$	Share 9 buns between three people. $$9 ÷ 3 = 3$$
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use a number line to show jumps in groups. The number of jumps equals the number of groups.	$28 ÷ 7 = 4$ Divide 28 into 7 groups. How many are in each group?
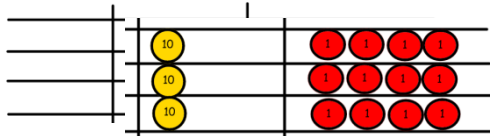
	96 ÷ 3 = 32	Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 20 ÷ 5 = ? 5 x ? = 20	
Division within arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 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 a remainder. 	Complete written divisions and show the remainder using r. 29 ÷ 8 = 3 REMAINDER 5 dividend divisor quotient remainder

Draw dots and group them to divide an amount and clearly show a remainder.

remainder 2

Short division			

Tens   Units

3   2

3

Use place value counters to divide using the bus stop method alongside

Calculations

42 ÷ 3

42 ÷ 3=
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.

Encourage them to move towards counting in multiples to divide more efficiently.

Begin with divisions that divide equally with no remainder.

$$2 \quad 1 \quad 8$$
3

Move onto

$$8 \quad 6 \quad r \quad 2$$
3

5 | 4 3 2

divisions with a remainder.

We exchange this ten for ten ones and then share the ones equally among the groups.

We look how much in 1 group so the answer is 14.

Finally move into decimal places to divide the total accurately.

$$
\begin{array}{r}
1\ 4\ .\ 6 \\
3\ 5\ \overline{)\ 5\ 1_{16}\ 1_{21}\ .\ 0}
\end{array}
$$

Curriculum Progression

Mixed Age Classes

St. Mary's CVA, New Mills

PLACE VALUE

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value: Counting	• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • Count numbers to 100 in numerals; count in multiples of twos, fives and tens Y1/2- Autumn 1 Y1/2- Autumn 3 Y1/2- Spring 2 Y1/2- Summer 3	• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward Y1/2- Autumn 3 Y2/3- Autumn 3	• count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number Y2/3- Autumn 1 Y2/3- Autumn 3 Y2/3- Summer 2 Y3/4- Autumn 1 Y3/4- Autumn 3	• count in multiples of 6, 7, 9, 25 and 1000 • count backwards through zero to include negative numbers Y3/4- Autumn 1 Y3/4- Autumn 3 Y4/5- Autumn 1 Y4/5- Autumn 3	• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • count forwards and backwards with positive and negative whole numbers, including through zero Y4/5- Autumn 1 Y5/6- Autumn 1	
Place Value: Represent	• identify and represent numbers using objects and pictorial representations • read and write numbers to 100 in numerals • read and write numbers from 1 to 20 in numerals and words. Y1/2- Autumn 1 Y1/2- Autumn 3 Y1/2- Spring 2 Y1/2- Summer 3	• read and write numbers to at least 100 in numerals and in words • identify, represent and estimate numbers using different representations, including the number line Y1/2- Autumn 3 Y2/3- Autumn 3	• identify, represent and estimate numbers using different representations • read and write numbers up to 1000 in numerals and in words Y2/3- Autumn 1 Y3/4- Autumn 1	• identify, represent and estimate numbers using different representations • read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value Y3/4- Autumn 1 Y4/5- Autumn 1	• read, write, (order and compare) numbers to at least 1 000 000 and determine the value of each digit • read Roman numerals to 1000 (M) and recognise years written in Roman numerals. Y4/5- Autumn 1 Y5/6- Autumn 1	• read, write, (order and compare) numbers up to 10 000 000 and determine the value of each digit Y5/6-Autumn 1

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value : Use PV and Compare		• given a number, identify one more and one less Y1/2- Autumn 1 Y1/2- Autumn 3 Y1/2- Spring 2 Y1/2- Summer 3	• recognise the place value of each digit in a two-digit number (tens, ones) • compare and order numbers from 0 up to 100; use <, > and = signs Y1/2- Autumn 3 Y2/3- Autumn 3	• recognise the place value of each digit in a three-digit number (hundreds, tens, ones) • compare and order numbers up to 1000 Y2/3- Autumn 1 Y3/4- Autumn 1	• find 1000 more or less than a given number • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) • order and compare numbers beyond 1000 Y3/4- Autumn 1 Y4/5- Autumn 1	• (read, write) order and compare numbers to at least 1 000 000 and determine the value of each digit Y4/5- Autumn 1 Y5/6- Autumn 1	• (read, write), order and compare numbers up to 10 000 000 and determine the value of each digit Y5/6- Autumn 1
Place Value: Problems& Rounding			• use place value and number facts to solve problems. Y1/2- Autumn 3 Y2/3- Autumn 3	• solve number problems and practical problems involving these ideas Y2/3- Autumn 1 Y3/4- Autumn 1	• round any number to the nearest 10, 100 or 1000 • solve number and practical problems that involve all of the above and with increasingly large positive numbers Y3/4- Autumn 1 Y4/5- Autumn 1	• interpret negative numbers in context • round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 • solve number problems and practical problems that involve all of the above Y4/5- Autumn 1 Y5/6- Autumn 1	• round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across zero • solve number and practical problems that involve all of the above Y5/6- Autumn 1

ADDITION & SUBTRACTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Recall, Represent, Use	• read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs • represent and use number bonds and related subtraction facts within 20	• recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	• estimate the answer to a calculation and use inverse operations to check answers	• estimate and use inverse operations to check answers to a calculation	• use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	
	Y1/2- Autumn 2 Y1/2- Summer 5	Y1/2- Autumn 2 Y2/3- Autumn 2	Y2/3- Autumn 2 Y2/3- Summer 2 Y3/4- Autumn 2	Y3/4- Autumn 2 Y4/5- Autumn 2	Y4/5- Autumn 2 Y5/6- Autumn 2 Y5/6- Summer 3	

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Calculations	• add and subtract one-digit and two-digit numbers to 20, including zero	• add and subtract numbers using concrete objects, pictorial representations, and mentally, including: ➢ a two-digit number and ones ➢ a two-digit number and tens ➢ two two-digit numbers ➢ adding three one-digit numbers	• add and subtract numbers mentally, including: ➢ a three-digit number and ones ➢ a three-digit number and tens ➢ a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	• add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	• add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers	• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations
	Y1/2- Autumn 2 Y1/2- Summer 5	Y1/2- Autumn 2 Y2/3- Autumn 2	Y2/3- Autumn 2 Y2/3- Summer 2 Y3/4- Autumn 2	Y3/4- Autumn 2 Y4/5- Autumn 2	Y4/5- Autumn 2 Y5/6- Autumn 2 Y5/6- Summer 3	Y5/6- Autumn 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition & Subtraction: Solve Problems	• solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9	• solve problems with addition and subtraction: ➢ using concrete objects and pictorial representations, including those involving numbers, quantities and measures ➢ applying their increasing knowledge of mental and written methods	• solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	• solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why • solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
	Y1/2- Autumn 2 Y1/2- Summer 5	Y1/2- Autumn 2 Y2/3- Autumn 2	Y2/3- Autumn 2 Y2/3- Summer 2 Y3/4- Autumn 2	Y3/4- Autumn 2 Y4/5- Autumn 2	Y4/5- Autumn 2 Y5/6- Autumn 2 Y5/6- Summer 3	Y5/6- Autumn 2

MULTIPLICATION & DIVISION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Recall, Represent, Use		• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	• recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	• recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations	• identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 • recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	• identify common factors, common multiples and prime numbers • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
		Y1/2- Autumn 3 Y1/2- Spring 1 Y2/3- Autumn 3 Y2/3- Spring 1	Y2/3- Autumn 3 Y2/3- Summer 2 Y3/4- Autumn 3	Y3/4- Autumn 3 Y3/4- Spring 1 Y4/5- Autumn 3 Y4/5- Spring 1	Y4/5- Autumn 3 Y5/6- Autumn 2 Y5/6- Summer 3	Y5/6- Autumn 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Calculations		• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	• write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	• multiply two-digit and three-digit numbers by a one-digit number using formal written layout	• multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers • multiply and divide numbers mentally drawing upon known facts • divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context • multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	• multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication • divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context • divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • perform mental calculations, including with mixed operations and large numbers
		Y1/2- Autumn 3 **Y1/2- Spring 1** **Y2/3- Autumn 3** **Y2/3- Spring 1**	**Y2/3- Autumn 3** **Y2/3- Spring 1** **Y2/3- Summer 2** **Y3/4- Autumn 3** **Y3/4- Spring 1**	**Y3/4- Autumn 3** **Y3/4- Spring 1** **Y4/5- Autumn 3** **Y4/5- Spring 1**	**Y4/5- Autumn 3** **Y4/5- Spring 1** **Y4/5- Spring 3** **Y5/6- Autumn 2** **Y5/6- Spring 2**	**Y5/6- Autumn 2**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication & Division: Solve Problems	• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher Y1/2- Autumn 3 Y1/2- Spring 1 Y1/2- Summer 5	• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts Y1/2- Autumn 3 Y1/2- Spring 1 Y2/3- Autumn 3 Y2/3- Spring 1	• solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects Y2/3- Spring 1 Y2/3- Summer 2 Y3/4- Spring 1	• solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects Y3/4- Spring 1 Y4/5- Spring 1	• solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes • solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates Y4/5- Autumn 3 Y4/5- Spring 1 Y5/6- Autumn 2	• solve problems involving addition, subtraction, multiplication and division Y5/6- Autumn 2
Multiplication & Division: Mixed Operations					• solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign Y4/5- Autumn 3 Y4/5- Spring 1 Y5/6- Autumn 2	• use their knowledge of the order of operations to carry out calculations involving the four operations Y5/6- Autumn 2

FRACTIONS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions: Recognise and Write		• recognise, find and name a half as one of two equal parts of an object, shape or quantity • recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	• recognise, find, name and write fractions $\frac{1}{3}, \frac{1}{4}, \frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity	• count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 • recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators • recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators	• count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.	• identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths • recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]	
		Y1/2- Spring 5	Y1/2- Spring 5 Y2/3- Spring 5	Y2/3- Spring 5 Y3/4- Spring 3	Y3/4- Spring 4 Y4/5- Spring 3	Y4/5- Spring 2 Y5/6- Autumn 3 Y5/6- Spring 1 Y5/6- Summer 4	
Fractions: Compare			• Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$	• recognise and show, using diagrams, equivalent fractions with small denominators • compare and order unit fractions, and fractions with the same denominators	• recognise and show, using diagrams, families of common equivalent fractions	• compare and order fractions whose denominators are all multiples of the same number	• use common factors to simplify fractions; use common multiples to express fractions in the same denomination • compare and order fractions, including fractions > 1
			Y1/2- Spring 5 Y2/3- Spring 5	Y2/3- Spring 5 Y3/4- Spring 3	Y3/4- Spring 3 Y4/5- Spring 2	Y4/5- Spring 2 Y5/6- Autumn 3 Y5/6- Spring 1 Y5/6- Summer 4	Y5/6- Autumn 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions: Calculations		• write simple fractions for example, $\frac{1}{2}$ of 6 = 3	• add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]	• add and subtract fractions with the same denominator	• add and subtract fractions with the same denominator and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams	• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions • multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] • divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
		Y1/2- Spring 5 Y2/3- Spring 5	Y2/3- Spring 5 Y2/3- Summer 4 Y3/4- Summer 3	Y3/4- Spring 3 Y4/5- Spring 2	Y4/5- Spring 2 Y5/6- Autumn 3 Y5/6- Spring 1 Y5/6- Summer 4	Y5/6- Autumn 3
Fractions: Solve Problems			• solve problems that involve all of the above	• solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number		
			Y2/3- Spring 5 Y2/3- Summer 4 Y3/4- Summer 3	Y3/4- Spring 3 Y4/5- Spring 2		

DECIMALS

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Decimals: Recognise and Write				• recognise and write decimal equivalents of any number of tenths or hundredths • recognise and write decimal equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ **Y3/4- Spring 4** **Y3/4- Summer 1** **Y4/5- Spring 3** **Y4/5- Summer 1**	• read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$] • recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents **Y4/5- Spring 3** **Y5/6- Spring 2** **Y5/6- Summer 4**	• identify the value of each digit in numbers given to three decimal places **Y5/6- Spring 2**
Decimals: Compare				• round decimals with one decimal place to the nearest whole number • compare numbers with the same number of decimal places up to two decimal places **Y3/4- Summer 1** **Y4/5- Summer 1**	• round decimals with two decimal places to the nearest whole number and to one decimal place • read, write, order and compare numbers with up to three decimal places **Y4/5- Spring 3** **Y5/6- Spring 2** **Y5/6- Summer 4**	

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Decimals: Calculations & Problems				• find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths	• solve problems involving number up to three decimal places	• multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • multiply one-digit numbers with up to two decimal places by whole numbers • use written division methods in cases where the answer has up to two decimal places • solve problems which require answers to be rounded to specified degrees of accuracy
				Y3/4- Spring 4 Y4/5- Spring 3	Y4/5- Spring 3 Y4/5- Summer 1 Y5/6- Spring 2 Y5/6- Spring 3 Y5/6- Summer 4	Y5/6- Spring 2

FRACTIONS, DECIMALS & PERCENTAGES

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions, Decimals and Percentages				• solve simple measure and money problems involving fractions and decimals to two decimal places	• recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal • solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25	• associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts
				Y3/4- Spring 3 Y3/4- Spring 4 Y3/4- Summer 1 Y3/4- Spring 2 Y3/4- Spring 3 Y3/4- Summer 1	Y4/5- Spring 3 Y5/6- Spring 2 Y5/6- Summer 4	Y5/6- Spring 2

RATIO & PROPORTION

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Ratio and Proportion						• solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts • solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison • solve problems involving similar shapes where the scale factor is known or can be found • solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. **Y5/6- Spring 1** **Y5/6- Spring 2**

ALGEBRA

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Algebra	• solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ – 9	• recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	• solve problems, including missing number problems			• use simple formulae • generate and describe linear number sequences • express missing number problems algebraically • find pairs of numbers that satisfy an equation with two unknowns • enumerate possibilities of combinations of two variables. **Y5/6- Spring 3**

MEASURE

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Using Measures	• compare, describe and solve practical problems for: ➢ lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] ➢ mass/weight [for example, heavy/light, heavier than, lighter than] ➢ capacity and volume [for example, full/empty, more than, less than, half, half full, quarter] ➢ time [for example, quicker, slower, earlier, later] • measure and begin to record the following: ➢ lengths and heights ➢ mass/weight ➢ capacity and volume ➢ time (hours, minutes, seconds)	• choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels • compare and order lengths, mass, volume/capacity and record the results using >, < and =	• measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	• Convert between different units of measure [for example, kilometre to metre; hour to minute] • estimate, compare and calculate different measures	• convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) • understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints • use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling	• solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate • use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places • convert between miles and kilometres
	Y1/2- Spring 3 **Y1/2- Summer 2** **Y1/2- Summer 4**	**Y1/2- Spring 3** **Y1/2- Summer 4** **Y2/3- Spring 3** **Y2/3- Summer 3**	**Y2/3- Spring 3** **Y2/3- Summer 3** **Y3/4- Spring 2** **Y3/4- Spring 4**	**Y3/4- Spring 2** **Y3/4- Summer 2** **Y4/5- Autumn 4** **Y4/5- Summer 2**	**Y4/5- Autumn 4** **Y4/5- Summer 6** **Y5/6- Spring 4** **Y5/6- Summer 5**	**Y5/6- Spring 4**

MEASURE: Money

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Money	• recognise and know the value of different denominations of coins and notes	• recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value • find different combinations of coins that equal the same amounts of money • solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change	• add and subtract amounts of money to give change, using both £ and p in practical contexts	• estimate, compare and calculate different measures, including money in pounds and pence	• use all four operations to solve problems involving measure [for example, money]	
	Y1/2- Autumn 2	Y1/2- Autumn 2 Y2/3- Autumn 2	Y2/3- Autumn 2 Y3/4- Summer 1	Y3/4- Summer 1 Y4/5- Summer 1	Y4/5- Summer 1 Y5/6- Spring 3	

MEASURE: Time

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Time	• sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] • recognise and use language relating to dates, including days of the week, weeks, months and years • tell the time to the hour and half past the hour and draw the hands on a clock face to show these times	• compare and sequence intervals of time • tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times • know the number of minutes in an hour and the number of hours in a day	• tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks • estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight • know the number of seconds in a minute and the number of days in each month, year and leap year • compare durations of events [for example to calculate the time taken by particular events or tasks]	• read, write and convert time between analogue and digital 12- and 24-hour clocks • solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days	• solve problems involving converting between units of time	• use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa
	Y1/2- Summer 2	Y1/2- Summer 2 Y2/3- Summer 1	Y2/3- Summer 1 Y3/4- Summer 2	Y3/4- Summer 2 Y4/5- Summer 2	Y4/5- Summer 2 Y5/6- Spring 4	Y5/6- Summer 4

MEASURE: Perimeter, Area & Volume

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Measurement: Perimeter, Area, Volume			• measure the perimeter of simple 2-D shapes	• measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • find the area of rectilinear shapes by counting squares	• measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres • calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes • estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes)] and capacity [for example, using water]	• recognise that shapes with the same areas can have different perimeters and vice versa • recognise when it is possible to use formulae for area and volume of shapes • calculate the area of parallelograms and triangles • calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]
			Y2/3- Spring 4 Y3/4- Spring 2	Y3/4- Spring 2 Y3/4- Autumn 4	Y4/5- Autumn 4 Y4/5-Summer 6 Y5/6- Spring 5	Y5/6- Spring 5

Geometry: Shape

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: 2-D Shapes	• recognise and name common 2-D shapes [for example, rectangles (including squares), circles and triangles] Y1/2- Spring 4	• identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line • identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] • compare and sort common 2-D shapes and everyday objects Y1/2- Spring 4 Y2/3- Spring 4	• draw 2-D shapes Y2/3- Spring 4 Y3/4- Summer 4	• compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes • identify lines of symmetry in 2-D shapes presented in different orientations Y3/4- Summer 4 Y4/5- Summer 4	• distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • use the properties of rectangles to deduce related facts and find missing lengths and angles Y4/5- Summer 4 Y5/6- Summer 1	• draw 2-D shapes using given dimensions and angles • compare and classify geometric shapes based on their properties and sizes • illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius Y5/6- Summer 1
Geometry: 3-D Shapes	• recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] Y1/2- Spring 4	• recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]. • compare and sort common 3-D shapes and everyday objects Y1/2- Spring 4 Y2/3- Spring 4	• make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them Y2/3- Spring 4 Y3/4- Summer 4		• identify 3-D shapes, including cubes and other cuboids, from 2-D representations Y4/5- Summer 4 Y5/6- Summer 1	• recognise, describe and build simple 3-D shapes, including making nets Y5/6- Summer 1

Geometry: Angles & Lines

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: Angles & Lines			• recognise angles as a property of shape or a description of a turn • identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle • identify horizontal and vertical lines and pairs of perpendicular and parallel lines	• identify acute and obtuse angles and compare and order angles up to two right angles by size • identify lines of symmetry in 2-D shapes presented in different orientations • complete a simple symmetric figure with respect to a specific line of symmetry	• know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles • draw given angles, and measure them in degrees • identify: ➤ angles at a point and one whole turn (total 360°) ➤ angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°) ➤ other multiples of 90°	• find unknown angles in any triangles, quadrilaterals, and regular polygons • recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
			Y2/3- Spring 4 **Y3/4- Summer 4**	**Y3/4- Summer 4** **Y4/5- Summer 4**	**Y4/5- Summer 4** **Y5/6- Summer 1**	**Y5/6- Summer 1**

Geometry: Position & Direction

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Geometry: Position & Direction	• describe position, direction and movement, including whole, half, quarter and three-quarter turns	• order and arrange combinations of mathematical objects in patterns and sequences • use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)		• describe positions on a 2-D grid as coordinates in the first quadrant • describe movements between positions as translations of a given unit to the left/right and up/down • plot specified points and draw sides to complete a given polygon	• identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed	• describe positions on the full coordinate grid (all four quadrants) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes
	Y1/2- Summer 1	Y1/2- Spring 4 Y1/2- Summer 1 Y2/3- Spring 4		Y3/4- Summer 4 Y4/5- Summer 5	Y4/5- Summer 5 Y5/6- Summer 2	Y5/6- Summer 2

Statistics

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Statistics: Present and Interpret		• interpret and construct simple pictograms, tally charts, block diagrams and simple tables Y1/2- Spring 2 Y2/3- Spring 2	• interpret and present data using bar charts, pictograms and tables Y2/3- Spring 2 Y3/4- Summer 3	• interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs Y3/4- Summer 3 Y4/5- Summer 3	• complete, read and interpret information in tables, including timetables Y4/5- Summer 3 Y5/6- Spring 6	• interpret and construct pie charts and line graphs and use these to solve problems Y5/6- Spring 6
Statistics: Solve Problems		• ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity • ask and answer questions about totalling and comparing categorical data Y1/2- Spring 2 Y2/3- Spring 2	• solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables Y2/3- Spring 2 Y3/4- Summer 3	• solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs Y3/4- Summer 3 Y4/5- Summer 3	• solve comparison, sum and difference problems using information presented in a line graph Y4/5- Summer 3 Y5/6- Spring 6	• calculate and interpret the mean as an average Y5/6- Spring 6

Glossary of Key Mathematical Vocabulary

Reception	Definition	Example
Above	Used to describe a higher position than another object.	The Maths Meetings board is **above** the sink.
Add	Carry out the process of addition.	I can **add** two numbers together to find a total.
Addition	The operation to combine at least two numbers or quantities to form a further number or quantity, the sum or total. Addition is the inverse operation to subtraction.	Three plus seven is equal to ten. This is an **addition** equation.
Altogether	In total.	That will be £2 **altogether** please.
Balance	A measuring tool used to weigh objects. It has two dishes hanging on a bar. Both dishes will be level when the contents weigh the same. Also, as a verb, indicates equivalence and equality.	The objects in the **balance** are unequal in weight because the dish on the right side is lower down that the dish on the left side. The two objects **balance** which means they have the same mass.
Before	In front of or prior to.	The number '3' comes **before** '5' on the number line.
Below	Used to describe a lower position than another object.	The sink is **below** the Maths Meetings board.
Between	Indicates a position in relation to two other places or objects on either side.	The teacher is standing **between** two tables.
Capacity	The amount of liquid a container can hold.	This cup is full to **capacity** because it cannot hold any more water.
Circle	The name of a 2-D shape. A circle has a curved side.	
Clock	A tool used to measure time.	The **clock** shows us that the time is now 2 o'clock.
Compare	Look for similarities and/or differences between at least two objects or sets.	I can **compare** these two sets – this set has more.

Corner	A point where two or more lines meet. The correct mathematical term is vertex (vertices).	The table has four **corners** (vertices).
Cost	A monetary value assigned to a good or service.	This apple **costs** 10p. What coin could I use to pay for it?
Count	Assigning one number name to each of a set of objects to determine how many there are.	I **counted** the children in the group – there are four so we will need four pencils.
Cube	A 3-D shape with six identical square faces.	
Cuboid	A 3-D shape with six rectangular faces.	
Curved surface	A non-plane surface of a 3-D shape. Both cones and cylinders have curved surfaces.	The cone has a **curved** surface.
Cylinder	A 3-D shape with two circular faces joined by a curved surface.	
2-D	Abbreviation for two-dimensional. A figure is two-dimensional if it lies on a plane.	A square is a **2-D** shape.

3-D	Abbreviation for three-dimensional. A solid is three-dimensional and occupies space.	A cylinder is a **3-D** shape.
Describe	To express mathematical features, qualities and details in words.	Can you **describe** the properties of a cube?
Difference	The numerical difference between two numbers or sets of objects. It is found by comparing the quantity of one set of objects with another.	The **difference** between ten and six is four.
Direction	The orientation of a line in space.	Which **direction** should we jump – forwards or backwards?
Distance	A measure between two points or things.	The **distance** between my house and the school is longer than that between the school and the train station.
Double	To multiply by two or add a value to itself.	Ten is **double** five.
Edge	A line segment joining two vertices of a plane figure (2-D shape) and the intersection of two plane faces (in a 3-D shape).	A triangle has three **edges** and a cube has 12 **edges**.
Empty	Containing nothing. Most commonly used in the context of measures.	There is no more water left in the jug – it is **empty**.
Equal	Indicates equivalence between two values and can be expressed with the symbol '='. The symbol is read as 'is equal to' which means the	My sets are **equal** because there are four bears in this set and there are four bears in this set.

|	same as. Expressions on either side of the symbol have the same value.	
Face	One of the plane surfaces of a solid shape.	A cube has six **faces**.
Fewer	A lesser amount – used when counting discrete objects, i.e. countable objects such as, pens, teddies, counters, etc.	There are **fewer** buttons on my coat than yours.
First	Comes before all others in time or position.	**First** I brush my teeth. Then I go to bed.
Flat	A level surface.	The table has a **flat** rectangular surface.
Full	Contains/holds as much or as many as possible; has no empty space.	The juice carton is not **full** because I drank some.
Group	To make equal size groups. This is one model for division.	I will **group** the crayons equally so that each person gets two.
Half	One of two equal parts of a shape, quantity or object.	I have shared the dolls into two equal groups – I have **half** and you have **half**.
Intersection of sets	Where the two subsets overlap in a Venn diagram. Objects or values which belong to both subsets are placed here.	The number 4 belongs in the **intersection** because it is even *and* less than 5.
Last	Comes after all others in time or order.	Rory is the **last** person in the line.
Length	A linear measurement.	The **length** of my snake is shorter than yours.
Less	A smaller amount or not as much.	I have 15p and you have 7p. you have **less** money than me.
Line	A set of adjacent points that has length but no width.	I have drawn a **line** matching the number four with the four ducks.
Long	An adjective used to describe length.	I have a **long** piece of string.

Mass	A measure relating to the amount of matter within a given object.	The **mass** of the school bag is greater than the **mass** of the book.
Measure	To find the size of something in a given unit.	How might we **measure** how much flour we need to bake a cake?
Minus	A name for the symbol '-', which denotes the operation of subtraction.	Three **minus** one is equal to two.
More	A greater amount.	I have six apples and you have two. I have **more**.
Next	Comes immediately after the present one in order.	The **next** shape in my pattern is a square.
Number bond	A pair of numbers with a given total.	Five and four make a **number bond** to nine.
Number line	A linear, continuous representation of number. Each number occupies a point on the line, and there is an equal interval between each number.	This **number line** starts at zero and ends at ten.
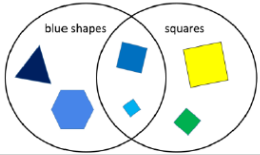
Number track	A linear, discrete representation of number. Each number is positioned in a square on the track.	I can count from one to ten, moving a counter along this **number track**.
Order	Describes the placement of items according to given criteria or in a pattern. As a verb, to place items according to given criteria or in a pattern.	I have **ordered** the bears from smallest to biggest.
Pair	A set of two things used together.	Socks come in a **pair** – one for each foot.
Pattern	A systematic arrangement of numbers, shapes or other elements according to a rule.	The **pattern** is red, blue, red, blue, red blue.
Plus	The word representing the operation of addition. It is also the name for the symbol '+'.	Five apples **plus** two apples are equal to seven apples.
Rectangle	A quadrilateral with four right angles.	
Second	1. A unit of time. 2. An ordinal number.	Mohsin is **second** in the line today.
Sequence	A series of numbers or other elements which follow a rule.	The number 3 is next in the **sequence** because each number is one less than the one before.
Set	A defined group of objects, numbers or other elements.	I have placed all the purple counters in this **set** because they are all the same colour.
Share	To distribute fairly between a given number of recipients. This is one model for division.	I will **share** the crayons equally between the people at the table.
Short	An adjective used to describe length.	This string will not reach to the door. It is too **short**.
Side	A straight line that forms part of the boundary of a shape.	This shape has four straight **sides**.

Size	An element's overall dimensions or magnitude.	The **size** of my shoe is smaller than my teacher's.
Sort	To organise a set of elements into specified categories.	I will **sort** these objects based on their size.
Square	A quadrilateral with four equal length sides and four right angles.	
Straight	A line or movement uniform in direction, without bends or curves.	The walls of the school are **straight**.
Subtract	Carry out the process of subtraction.	Nine **subtract** three is equal to six.
Subtraction	The inverse operation to addition.	We are taking some away so it is a **subtraction** question.
Sum	The result of one or more additions.	The **sum** of five and three is eight.
Surface	An outer boundary of a 3-D object.	This cone has a curved **surface**.
Take away	Used in the reduction structure of subtraction. To remove a number of items from a set.	He ate three of the sweets so we need to **take away** three counters.

Tall	Measuring a specific distance from top to bottom.	Our class teacher is not as **tall** as our head teacher.
Time	Related to duration. Measured in seconds, minutes, hours, days, weeks, months, years etc.	After lunch it will be **time** for P.E.
Total	The sum found by adding.	There are a **total** of five people at this table.
Triangle	A polygon with three sides.	
Venn diagram	Two or more circles which represent given sets and intersect according these.	
Vertex (pl. vertices)	The point at which two or more lines intersect.	This shape has five **vertices**.
Weight	The force exerted on an object by gravity. Weight therefore changes with a change in gravitational force. Used interchangeably with mass until KS2.	The **weight** of this book is heavier than the pencil.
Zero	The number before one. It is neither positive nor negative.	**Zero** comes before one on the number track.

Year 1	Definition	Example
Analogue clock	A clock with a face and hands.	
Anticlockwise	Movement in the opposite direction to the motion of the hands of a clock.	
Approximate	The number is not exact but it is close.	Our PSHE lesson lasts **approximately** half an hour.
Array	An arrangement of counters or numbers, in columns and rows, used to represent multiplication and division	This **array** shows 3 × 4, 4 × 3, 12 ÷ 4 and 12 ÷ 3

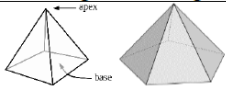| Term	Definition	Example
Block graph	The pre-cursor to the bar graph, this representation of data has an x- and y-axis and one block represents one item. Each block is adjoined to the adjacent block.	*How children travel to school* (block graph showing walk, bus, car, bike, scooter)
Chart	A table or graph.	I will mark one day for the sun on our weather **chart**.
Chronological	In time order.	I ordered the events in my day **chronologically**. I woke up, ate my breakfast, went to school then came home.
Clockwise	Movement in the direction of the hands of a clock.	(clockwise arrow symbol)
Cone	A 3-D shape with one circular plane face, which tapers to an apex.	(cone diagram)
Continuous surface	An outer boundary of a 3-D object which is uninterrupted by any plane surfaces.	A sphere has a **continuous surface**.
Data	Quantitative information which has been counted or measured.	This block graph shows us **data** for the colour of the cars in the car park.
Decreasing	Becoming smaller in value. Used in relation to number sequences.	15, 14, 13, 12. This number pattern is **decreasing** by one each time.

Term	Definition	Example
Diagram	An illustration, drawing or representation.	I will draw a **diagram** to show how I programed my floor toy to move.
Digit	One of the ten Arabic numerals 0 to 9, from which we compose numbers.	The number 54 has the **digit** five in the tens column and the **digit** four in the ones. The **digit** five has a value of fifty.
Divide	To share or group into equal parts.	I can **divide** 12 by three using grouping or sharing.
Estimate	An appropriately accurate guess, depending on the context and numbers involved.	I **estimate** there are eight cubes in the cup because it looks about double four but fewer than ten.
Even number	A number with a 0, 2, 4, 6 or 8 in the ones and therefore exactly divisible by two.	32 is an **even number**.
Facts	Related to the four operations (+, -, ×, ÷). Pupils should be supported in achieving	Number bonds to and within 10 and 20 are **facts**, e.g. 3 + 7 = 10.
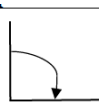
Term	Definition	Example
	fluency, i.e. very fast recall, in these facts. These then become **known facts**.	
Fraction	1. A part of a whole number, quantity or shape. 2. Expressing a division relationship between two integers in the form $\frac{a}{b}$.	I have shared my sweets into four equal parts. Everyone will get a **fraction** of the whole quantity of sweets. One group is a quarter of the whole.
Half turn	A 180 degree rotation, i.e. $\frac{1}{2}$ of a 360 degree or 'full' turn.	(half turn arrow diagram)
Hour	A unit of time.	There are 24 hours in one day.
Increasing	Becoming greater in value. Used in relation to number sequences.	2, 4, 6, 8. This number pattern is **increasing** by two each time.
Kilogram	A standard unit of mass, equal to 1000 grams.	The book has a mass of two **kilograms**.
Known fact	A number fact which has been committed to memory (or very fast recall) and can be applied fluently to various calculation strategies.	When I use the 'Make ten' strategy to add, I use **known facts** to partition the number I'm adding.
Left	Indicating the position or direction.	Make a quarter turn **left** and walk forward three steps.
Litre	A standard unit of volume, equal to 1000 millilitres.	The capacity of the jug is about half a **litre**.

Mental calculation	A calculation performed without using a formal written strategy. Simple jottings may aid a mental calculation.	14 plus 5 is equal to 19. I completed this using a **mental calculation** and deriving facts because I know that four plus five is equal to nine.
Metre	A standard unit of measure, equal to 100 centimetres.	I estimate that the table is about a **metre** tall.
Minute	A unit of time.	We will have lunch in five **minutes.**
Oblong	A quadrilateral with two pairs of parallel sides of equal length.	
Odd number	An integer which is not divisible by two without a remainder.	All numbers which end in 1, 3, 5, 7 and 9 are **odd numbers**.
Partition	To split a number into two or more parts.	The number 23 can be **canonically partitioned** (by place value) into 20 and 3, or **non-canonically partitioned** in many

		different ways, including 18 and 5, 17 and 6, etc.
Place value	A system for writing numbers, in which the value of a digit is defined by its position within the number.	In the number 452 written in base ten, the digit four has a value of 400, the five has a value of 50 and the two has a value of two.
Position	Location, expressed either descriptively using positional prepositions, or specified by coordinates.	The book is **on** the table. The clock is hanging **above** the board.
Pound (sterling)	The official currency of the United Kingdom.	**Pounds sterling** are written using the £ symbol. There are 100 pence in one **pound** sterling.
Property	Any attribute.	A **property** of a triangle is that it has three straight sides and three vertices, the sum of whose angles is 180 degrees.
Pyramid	A 3-D shape with a polygonal base and otherwise triangular faces, which form edges with the base, and which meet at an apex.	
Quantity	An amount, in some cases given a numerical value.	A **quantity** of apples is placed on the left-hand side of the balance. How many kilogram masses will we need to place on the right to balance the apples?
Quarter	One of four equal parts of a whole, quantity or object.	I have shared the eight conkers into four equal groups – I have two conkers, which is one **quarter** of the whole.

Quarter turn	A 90-degree rotation, i.e. $\frac{1}{4}$ of a 360 degree 'full' turn.	
Repeated addition	A structure of multiplication where equal parts are added to make a whole.	I can show 4×5 as **repeated addition**: $4 + 4 + 4 + 4 + 4$.
Repeated subtraction	A structure of division, where equal parts are subtracted and the number of equal parts summed to calculate a quotient.	I can use **repeated subtraction** to calculate 20 divided by four: $20 - 4 - 4 - 4 - 4$.
Represent	To express or show a mathematical concept using words, numerals and symbols, pictures, diagrams, or concrete manipulatives.	I have used three blue cubes to **represent** the three oranges in the question. I used a part-whole model to **represent** the addition question.

Year 2	Definition	Example
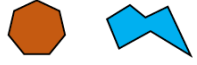
Right	Indicating the position or direction.	The picture is on the **right**-hand side of the board.
Rule	A consistent pattern which allows generalisation. Awareness of a rule allows a pupil to continue a sequence or generate a related sequence.	2, 5, 8, 11, 14… The **rule** is that each number is three greater than the previous number. Therefore, the next number in this sequence will be 17.
Scales	An object used to measure mass.	The **scales** showed that the banana had a greater mass than the apple.
Sign	Synonymous with symbol in its mathematical context, e.g. +, -, ×, ÷, =.	20 □ 5 = 4. What is the missing **sign**?
Standard unit	A uniform measure, agreed upon as standard.	**Standard units** of mass include grams and kilograms. **Standard units** of length include centimetres, metres and kilometres. **Standard units** of volume and capacity include millilitres and litres.
Sphere	A 3-D shape with a continuous surface, which is at all points equidistant from its centre. It has an infinite number of flat faces and straight edges.	A bowling ball is a **sphere**.
Symbol	Synonymous with sign in its mathematical context, e.g. +, -, ×, ÷, =.	20 □ 5 = 4. What is the missing **symbol**?

Table	A structure organised into columns and rows, in which data can be recorded.	The information for Thursday is not yet complete on the **table** because it is only Wednesday.
Turn	Rotation (see half and quarter turn).	A whole turn is 360 degrees. A half turn is 180 degrees. A quarter turn is 90 degrees.
Unit	1. An element considered as a single entity. Ten single cubes can be grouped together to make a unit of ten. 2. A unit of measure, which can be standard or non-standard.	I regrouped ten ones for one **unit** of ten. Unifix cubes can be used as **units** of measure, but these are not **standard units**.
Volume	A quantity or amount of any substance and the 3-D space it fills.	The bottle contains a **volume** of one litre but its capacity is two litres. The bottle is half full.

Angle	The amount of turn, measured in degrees.	The **angle** is 60 degrees.
Calculate	To compute or work out mathematically.	Can you **calculate** the answer to 13 + 4?
Centimetre	A metric unit of length.	The book is 15 **centimetres** long.
Column	A vertical arrangement of numbers or objects.	23 has two tens – I will place them into the tens **column**.
Commutative	A property of addition and multiplication. It does not matter in which order the addends or factors are added or multiplied; the result will be the same.	4 + 6 = 10 6 + 4 = 10 This demonstrates that addition is **commutative**. Arrays demonstrate the **commutativity** of multiplication, i.e. 3 × 4 = 4 × 3
Consecutive	Following in order.	2, 3, 4, 5, 6 are **consecutive** numbers. 3, 6 and 9 are **consecutive** multiples of 3.
Denominator	The number written below the vinculum in a fraction. In a measure context, it indicates the number of equal parts into which the whole is divided. In a division context, it is the divisor.	In the fraction one quarter, four is the **denominator**.
Division	The process of partitioning a whole into equal parts.	12 **divided** by 3 is equal to 4.
Efficient	Well-organised. Choosing an efficient computation strategy requires consideration of the numbers involved and will normally utilise 'known facts'.	I will use my number bonds knowledge to calculate 22 + 7 **efficiently**. I know that 2 + 7 is equal to 9, so the answer is 29. That's more efficient that counting on seven.
Frequency	The number of times something occurs within a data set.	4 pupils have brown hair. The **frequency** of brown hair is 4.
Gram	A metric unit of mass.	The pencil weighs 20 **grams**.
Heptagon	A polygon with seven sides and seven angles.	
Hexagon	A polygon with six sides and six angles.	
Inverse operations	Opposite operations that 'undo' each other.	Addition and subtraction are **inverse** operations.
Millilitre	A metric unit of capacity/volume.	The can of fizzy drink has a capacity of 330 **millilitres**.
Multiple	The result of multiplying a number by an integer, for example, 12 is a multiple of 3 and 4 because 3 × 4 = 12.	36 is a **multiple** of three because three multiplied by 12 is equal to 36. It is also a **multiple** of 12 for the same

		reason (and 1, 2, 4, 6, 9, 18 and 36).
Multiplication	One of the four mathematical operations. Multiplication can be understood as repeated addition or scaling (introduced in Year 3).	The **multiplication** symbol is ×.
Multiply	To increase a quantity by a given scale factor.	I can **multiply** 3 by 4 which is equal to 12.
Near double	When two numbers involved in an addition are close in value, such as 23 + 22. The numbers can be treated as exact doubles, followed by compensating.	To calculate 23 + 22, I can use the **near double** strategy. I can double 22 and then add one more.
Non-unit fraction	A fraction with a numerator greater than one.	Two thirds is a **non-unit fraction.**
Numerator	The number written above the vinculum in a fraction. In a measure context, it indicates the specified number of parts out of the whole. In a division context, it is the dividend.	In the fraction one quarter, one is the **numerator**.
Octagon	A polygon with eight sides and eight angles.	
Operation	A mathematical process. The four mathematical operations are addition, subtraction, multiplication and division.	4 + 2 = 6. The **operation** is addition.

Operation	A mathematical process. The four mathematical operations are addition, subtraction, multiplication and division.	4 + 2 = 6. The **operation** is addition.
Pentagon	A polygon with five sides and five angles.	
Pictogram	A representation of data using pictures or symbols.	Countries people visited France Germany America China Australia Each ● stands for 10 people.
Quadrilateral	A 2D shape with four sides and four angles. which add up to 360 degrees.	
Relationship	The way in which two or more things are connected.	The **relationship** between addition and subtraction is that they are the inverse of each other.
Right angle	An angle of 90 degrees.	A square has four **right angles**.

Rotation	The act of rotating about an axis/centre.	I will **rotate** the square 90 degrees clockwise.
Scale	Equally spaced markings on a measuring device which can be read to quantify a measurement.	Using the **scale** on the ruler, the book measures 15cm.
Symmetry	A shape is symmetrical when it fits exactly onto itself when folded in half.	This triangle has one line of **symmetry**.
Tally	A form of counting. Each tally is a vertical mark. After the fourth vertical mark, a fifth horizontal/diagonal mark is drawn to create a group of five.	Four children have black hair; I will record this as four **tallies**.
Temperature	The measure of heat.	Outside has a **temperature** of 15 degrees Celsius.
Unit fraction	A fraction with a numerator of one.	One-third is a **unit fraction**.
Vinculum	A horizontal line that separates the numerator and the denominator in a fraction.	$\frac{1}{4}$ ← vinculum

Year 3	Definition	Example
Acute angle	An angle that is smaller than a right angle.	It is smaller than my right angle checker so this must be an **acute angle**.
Axis (plural: axes)	A real or imaginary reference line. The y-axis (vertical) and x-axis (horizontal) on charts and graphs are used to show the measuring scale or labels for the variables.	The y-**axis** on this bar graph shows you how many pupils preferred each colour.
Bar graph	A representation of data in which the frequencies are represented by the height or length of the bars.	This **bar graph** shows us the preferred colours of the pupils in our Year 3 class.
Columnar addition/subtraction	The formal written algorithms for addition and subtraction that are exemplified in *Mathematics Appendix 1* of the 2014 national curriculum.	Solve the following calculations by using the appropriate method of **columnar addition** or **subtraction**.
Factor	A number, that when multiplied with one or more other factors, makes a given number.	The number six has four **factors**: 1, 2, 3 and 6.
Formal written methods	Exemplified in *Mathematics Appendix 1 (see above)*. As	Pupils should only use **formal written methods**

|		
	well as including columnar addition and subtraction, these also consist of written algorithms for multiplication and division.	for calculations that cannot be efficiently calculated using mental strategies (with or without jottings).
Horizontal	Horizontal refers to planes and line segments that are parallel to the horizon.	The x-axis on a graph should be **horizontal**.
Irregular	In geometry, irregular is a term used to describe shapes that are not regular (see below).	The sides and the angles of this pentagon are not all equal so the pentagon is **irregular**.
Kilometre	A metric unit measure of length that is equal to one thousand metres.	The distance from the school to Arun's house was exactly one **kilometre**.
Millimetre	A metric unit measure of length that is equal to one thousandth of one metre.	The length of Philippa's ruler is 300 **millimetres**.
Numeral	A numeral is a symbol (or group of symbols) used to represent a number.	Whole numbers can all be represented as **numerals** consisting of the digits 0 to 9.
Obtuse angle	An angle that is greater than a right angle but less than 180 degrees.	It is greater than my right angle checker so this angle must be **obtuse**.
Parallel	Line segments that can be described as parallel must be on the same plane and will never meet, regardless of how far either or both line segments are extended.	The opposite sides of a square are **parallel**.

|		
Perimeter	The perimeter of a 2-D shape is the total distance around its exterior.	I know that one side of this square is 2cm so it must have a **perimeter** of 8cm.
Perpendicular	A pair of line segments (or surfaces) can be described as perpendicular if they intersect at (or form) a right angle.	The adjacent sides of a rectangle are **perpendicular**.
Place holder	A place holder is a zero used in any place value column (that contains a value of zero) to clarify the relative positions of the digits in other places.	I need to use a **place holder** in the ones column to make it clear that my number is 320 and not 32.
Prism	A prism is a 3-D solid with two identical, parallel bases and otherwise rectangular faces.	A triangular **prism** has five faces, consisting of three rectangles and two triangles which are parallel.
Product	The result you get when you multiply two numbers.	24 is the **product** of 3 and 8.
Regular	Regular 2-D shapes (regular polygons) have angles that	A square is a **regular** 2-D shape because all four angles

	are all equal and side lengths that are all equal. Regular 3-D shapes (the Platonic Solids) are those that have congruent (exactly the same) faces of a single regular polygon.	are right angles and all four sides are the same length. A cube is a **regular** 3-D shape with six identical square faces.
Roman numeral	Roman numerals are a system of symbols used to represent numbers that were developed and used by the Romans. They do not use a place value system.	The number twelve on this clock is represented by the **Roman numerals** XII, which is 10 + 1 + 1.
Round	Approximate a number, normally to the nearest multiple of ten, to make it easier with which to calculate.	I would **round** the number 17 to 20 because it is three away from 20 but seven away from 10.
Square-based pyramid	A pyramid is a 3-D shape with a 2-D shape (which gives the pyramid its name) as a base and triangular faces that taper to a point called a vertex or apex.	This **square-based pyramid** has five faces; one square face and four triangular faces.
Triangle-based pyramid		This **triangle-based pyramid** has four triangular faces.

Year 4	Definition	Example
Area	The space a surface takes up inside its perimeter. Area is always measured in square units.	The **area** is 8 square units.
Associative law	No matter how the parts in an addition or multiplication equation are grouped, the answer will be the same.	$(6 + 3) + 2 = 11$ $6 + (3 + 2) = 11$ Addition and multiplication are **associative**. Subtraction and division are not.
Convert	To change from one unit of measurement to another.	2 km can be **converted** to metres – it is equal to 2000 m.
Coordinate	The position of a point, usually described using pairs of numbers. Sometimes called Cartesian coordinates, after the mathematician Rene Descartes.	The **coordinate** (3,4) describes a point that is 3 on the x axis and 4 on the y axis.
Decimal fraction	A fraction expressed in its decimal form.	Half written as a decimal fraction is 0.5.
Distributive law	The process whereby adding some numbers and then multiplying the sum gives the same answer as	$3 \times (2 + 4) = (3 \times 2) + (3 \times 4)$ $3 \times 12 = (3 \times 10) + (3 \times 2)$

	multiplying the numbers separately and then adding the products.	
Dividend	The amount that you want to divide.	In '12 ÷ 3 = 4', 12 is the **dividend**.
Divisor	The number you divide by.	In '12 ÷ 3 = 4', 3 is the **divisor**.
Equilateral	Having all sides the same length.	An **equilateral** triangle has three equal sides.
Equivalent	Equivalent means having the same value. Equivalent fractions have the same value.	$\frac{2}{4} = \frac{1}{2}$
Expression	One or a group of numbers, symbols or operators. An expression does not use equality or inequality signs. *Using an equality or inequality sign will give an equation.*	2×3 4^2
Grid	A series of evenly divided and equally spaced shapes, usually squares.	
Improper fraction	A fraction where the numerator is bigger than the denominator. These fractions are therefore greater than one whole.	$\frac{12}{11}$
Integer	A whole number that can be positive or negative.	6 is an integer, 0.6 is not.
Interval	An interval on a graph's axis lies between two values.	If one point on an axis is 50 and the next 60, the **interval** is 10.

Isosceles	Having two sides of equal length. Isosceles triangles have two equal sides; isosceles trapezia have two equal, non-parallel sides.	
Kite	A 2-D shape with two pairs of equal length adjacent sides. The diagonals intersect at right angles.	
Line graph	A graph that uses lines to connect the points on a data chart. Used to present continuous data, such as change over time.	Temperature graph
Mixed numbers	Numbers consisting of an integer and fractional part.	$1\frac{1}{2}; 3\frac{3}{4}$
Negative number	A number that is less than zero. (It is helpful to refer to these numbers as	-1, -24, -0.5 etc.

	'negative numbers' rather than 'minus' to avoid confusion with the operation 'minus'.)	
Parallelogram	A 2-D shape that has two pairs of parallel sides and equal opposite angles.	
Plot	To mark out a point on a graph or grid.	'**Plot** the point (3,6)' means to draw the precise location of that point, usually shown as a dot or a small cross.
Point	The precise location of a position on a 2-D plane.	An exact place on a graph or squared paper. A **point** is often represented by a capital letter.
Positive number	A number that is greater than zero. Zero is neither positive or negative.	3, 32, 0.5
Proper fraction	A fraction with a value less than one.	$\frac{1}{2}, \frac{3}{4}, \frac{5}{8}$
Protractor	A measuring device for measuring the size of an angle. Angles are measured in degrees (°).	
Quotient	The result when the dividend is divided by the divisor.	$15 \div 3 = 5$ **5** is the **quotient**.

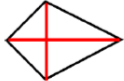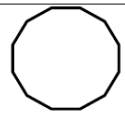| Rectilinear	A rectilinear shape has straight line edges which are perpendicular (all meet at right angles).	A rectangle. A straight-sided shape that can be divided up into other rectangles.
Rhombus	An equilateral parallelogram with four equal length sides.	
Scalene	A scalene triangle has three unequal sides and three unequal angles.	
Short division	A formal written layout where the quotient is calculated showing only one written step.	$\begin{array}{r} 7\,7 \\ 5\overline{\smash{)}3\,8\,5} \end{array}$
Short multiplication	A formal written layout where the multiplier is usually 9 or less.	$\begin{array}{r} 782 \\ \times\quad 9 \\ \hline 7038 \end{array}$

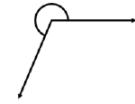| Simplify	To write a number or equation in its simplest form.	I can **simplify** $\frac{8}{10}$ to $\frac{4}{5}$.
Square centimetre	A unit of measure for area equal to a square with the dimensions 1 cm by 1cm.	Sometimes referred to as centimetre squared, abbreviated to **cm²**.
Trapezium	A quadrilateral with exactly one pair of parallel sides.	

Year 5	Definition	Example
Angle at a point	Angles that meet at a point that sum to 360°.	
Angle on a line	Angles formed on a straight line that sum to 180°.	
Average (mean)	A measure of central tendency. The mean average of a set of data is the sum of the quantities divided by the number of quantities.	The **mean average** of the set 4, 5, 5, 6 is 5 because $(4 + 5 + 5 + 6) \div 4 = 5$.
Common factor	A factor of two (or more) given numbers.	A **common factor** of 12 and 9 is 3 because $3 \times 4 = 12$ and $3 \times 3 = 12$.
Common multiple	A multiple of two (or more) given numbers.	A **common multiple** of 3 and 6 is 12 because $3 \times 4 = 12$ and $6 \times 2 = 12$.
Congruent	Used to describe two shapes or figures which are exactly the same size.	The two triangles are **congruent**. If I place one on top of the other, there is no overlap.
Cube number	The product of three equal factors.	Eight is a **cube number** because $8 = 2 \times 2 \times 2 = 2^3$.

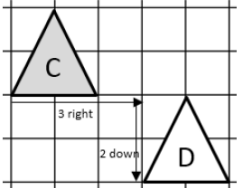| Cubic centimetre	A unit used to measure volume. The space taken up by a cube with edges of length 1 cm or which measures 1 cm × 1 cm × 1 cm.	The volume of this multilink cube is eight **cubic centimetres.**
Cubic metre	A unit used to measure volume. The space taken up by a cube with edges of length 1 metre.	The volume of this fridge is two **cubic metres.**
Decagon	A polygon with ten sides and ten angles.	

Degree	The unit of measure for angles.	A right angle is 90 **degree**s.
Diagonal	A straight line segment that joins one vertex to another.	The **diagonals** of a kite are perpendicular
Divisible	A number is said to be divisible by another if it can be divided by that number without a remainder.	24 is **divisible** by 8. When divided by 8 it gives a quotient of 3, with no remainder.
Dodecagon	A polygon with twelve sides and twelve angles.	
Long division	The formal written algorithm that can be used to divide by a number with two or more digits.	34 12	4 0 8 3 6 4 8 4 8 0
Long multiplication	The formal written algorithm that can be used to multiply a number by a number with two or more digits.	3 4 × 1 2 6 8 3 4 0 4 0 8
Negative integer	A whole number with a value less than zero. Zero is neither positive nor negative.	When the temperature falls below 0° a **negative integer** is used to record it.

Nonagon	A polygon with nine sides and nine angles.	
Percentage	The number of parts per hundred which is written using the % symbol.	30% means for every 100 there are 30.
Polygon	A 2-D shape with three or more straight sides.	Triangles and rectangles are examples of **polygons**.
Polyhedron (pl. polyhedra)	A 3-D shape with flat surfaces that are polygons.	A cuboid is a **polyhedron**. A cylinder is not a **polyhedron** because it has a curved surface.
Prime factor	A factor that is a prime number.	3 and 2 are **prime factors** of 6.
Prime number	A whole number with only two factors, one and the number itself.	2, 3, 5, 7, 11, 13, 17 and 19 are the **prime numbers** less than 20.
Remainder	The amount remaining after division when a whole number answer is needed.	21 divided by four is equal to five with a **remainder** of 1.

Reflection	A mirror image that is equidistant from a mirror line.	The shape has been **reflected** in the dotted mirror line.
Reflex angle	An angle that is greater than 180°.	
Scale (not to scale)	The ratio of lengths, in a drawing, are in proportion to the measurements of the real object. The lengths are not in proportion when not to scale.	The diagram was not drawn **to scale**. That means I can't use a ruler to measure the sides, because they are not in proportion to the real object.
Square metre	A unit of measure for area. The surface covered by a square with sides of length one metre.	The area of the floor in a room might be measured in **square metres**.
Square number	The product of two equal factors.	9 is a **square number** because $9 = 3 \times 3 = 3^2$.
Tetrahedron	A 3-D shape with four triangular faces.	

|	Definition	Example
Transformation	A collective term for the ways that shapes can be changed, resulting in congruent or similar shapes, i.e. translation, reflection, rotation or enlargement.	Translations and reflections are types of **transformations**.
Translation	When a shape moves so that it is in a different position but retains the same size, area, angles and side length and so is congruent.	Triangle C has been translated three right and two down resulting in triangle D.

Year 6	Definition	Example
Arc	A portion of the circumference of a circle	

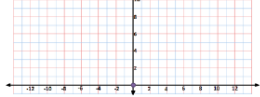|	Definition	Example
Brackets	The symbols ( ) used to separate parts of a multi-step calculation.	$(10 - 2) \times 3 = 21$
Centre	In a circle, the centre refers to one point that is equidistant to all points around the circumference of the circle.	To draw a circle, I place the point of my pair of compasses at the **centre**.
Circumference	The perimeter/boundary of a circle.	
Compasses	A tool for creating curved lines, arcs and circles.	I can use a pair of **compasses** to draw a circle with a radius of 4 cm.
Common fraction	A fraction written with a numerator and denominator separated by a vinculum.	One quarter can be written as a common fraction, $\frac{1}{4}$.
Degree of accuracy	A description of how accurately a value is communicated.	The **degree of accuracy** needed for the answer is one decimal place.
Diameter	A line from one point of the circumference of a circle to another on the opposite side, which must pass through the centre of the circle.	The circumference of a circle is the **diameter** multiplied by pi.

Equivalent expression	An expression, which can be algebraic, which is equal in value to another expression.	Find an **equivalent expression** to 17 + 10. 18 + 9 is an **equivalent expression** to 17 + 10.
Factorise	To identify factors of a given number. To express a number as factors.	I can **factorise** 12 by looking at its factor pairs. 1 × 12 = 12, 2 × 6 = 12, 3 × 4 = 12. So the factors of 12 are 1, 2, 3, 4, 6 and 12.
Foot/feet	An imperial unit of measure of length.	I am approximately five **feet** tall.
Formula	An algebraic expression of a rule.	The area of a rectangle can be found by multiplying the width and height. **a = w × h**
Gallon	An imperial unit of measure of volume/capacity.	A **gallon** is approximately 4.5 litres
Imperial unit	A unit of measure once officially used in the UK but is now used less often, except in the context of length. Includes miles, pounds and pints.	Miles are an **imperial unit** to measure length.

Inch	An imperial unit of measure.	An **inch** is approximately 2.2 cm.
Intersect	The point at which two (or more) lines meet is where they intersect.	The x and y axes **intersect** at (0,0)
Metric unit	A standard unit of measure used in the UK and Europe. Includes centimetres, litres and kilograms.	Litres are a **metric unit** used to measure volume.
Mile	An imperial unit of measure of length.	Five **miles** is equivalent to eight kilometres.
Net	A group of 2-D shapes which, when folded and connected, forms a 3-D polyhedron.	The **net** of a cube is comprised of six connected squares.
Order of operations	The internationally agreed order to complete operations in a multi-step equation with multiple operations.	(3 + 4) × 2 = □ The **order of operations** dictates that the operation within the brackets is completed first.
Origin	The point at which axes in a coordinates grid cross; the point (0,0).	The **origin** is indicated by the blue dot.
Ounce	An imperial unit of measure of mass.	The newborn baby had a mass of 6 pounds and 3 **ounces**.
Pie chart	A representation of a set of data where each segment represents one group in proportion to the whole.	Nationality of Astronauts on Board ISS January 2017
Pint	An imperial unit of measure.	I found a **pint** of milk on my doorstep.
Pound (mass)	An imperial unit of measure of mass.	The new-born baby had a mass of 6 **pounds** and 3 ounces.
Proportion	A comparison between two or more parts of a whole or group. Proportion expresses a part-whole relationship. This may be represented as a fraction, a percentage or a decimal.	Two thirds of a class were boys. The **proportion** of the class that is girls is one third.

Quadrant	One of four regions into which a coordinates grid is divided.	
Radius	A line from one point of the circumference of a circle to the centre of the circle.	
Ratio	A comparison between two or more parts of a whole or group. Ratio expresses a part-part relationship. This is usually represented in the form a:b.	For every 4 tulips there are 7 daffodils. The **ratio** of tulips to daffodils is 4:7.
Similar	Similar shapes are those which have the same internal angles and where the side lengths are in the same ratio or proportion. Enlarging a shape by a scale factor (for example by doubling all side lengths) creates a similar shape.	All squares are **similar** to one another.
Square millimetre	The area of a square with sides 1 mm.	The smallest squares on graph paper have an area of one **square millimetre.**

Square kilometre	The area of a square with sides 1 km.	The area of England is 130 279 **square kilometres.**
Vertically opposite angles	Angles which are positioned opposite to one another when two lines intersect.	The purple angles indicated are **vertically opposite angles.**