Parent Support Sheet – Maths – Lower Key Stage 2

At Yewtree, we follow Herts for Learning (HfL) Essentials Written Calculation Progression, which links the key concrete experiences with pictorial and abstract representations (written symbolic and spoken). This supports pupils to move with confidence and deep conceptual understanding through each strand of their calculation. Below is a summary of what concrete, pictorial and abstract representations are:

Concrete manipulatives - are objects that can be touched and moved by pupils to introduce, explore or reinforce a mathematical concept. They provide a vehicle to help pupils make sense of complex, symbolic and abstract ideas through exploration and manipulation. They also support the development of internal models and help build stronger memory pathways.

Pictorial (including jottings) - the act of translating the concrete experience into a pictorial representation helps focus attention on what has happened and why. This supports deeper understanding and a stronger imprint on memory. Pictorial representations are more flexible than concrete resources and, once understanding is secured, allow exploration of complex problems that may be challenging to reproduce with manipulatives (resources).

Abstract –Written forms of notation. These have developed through the history of mathematics. Clear individual steps in procedure are hidden or they have been shortcut. The informal and expanded methods highlight all the intermediate steps, repeating thought processes more closely and support understanding prior to compaction of the forms of notation.

Abstract - Spoken - learning to use the correct mathematical vocabulary is vital for the development of mathematical proficiency. The ability to articulate accurately allows pupils to communicate and build meaning. Ideas become more permanent. This can be constructed using speaking frames.

As set out by the National Curriculum – Maths Programme of Study, the principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

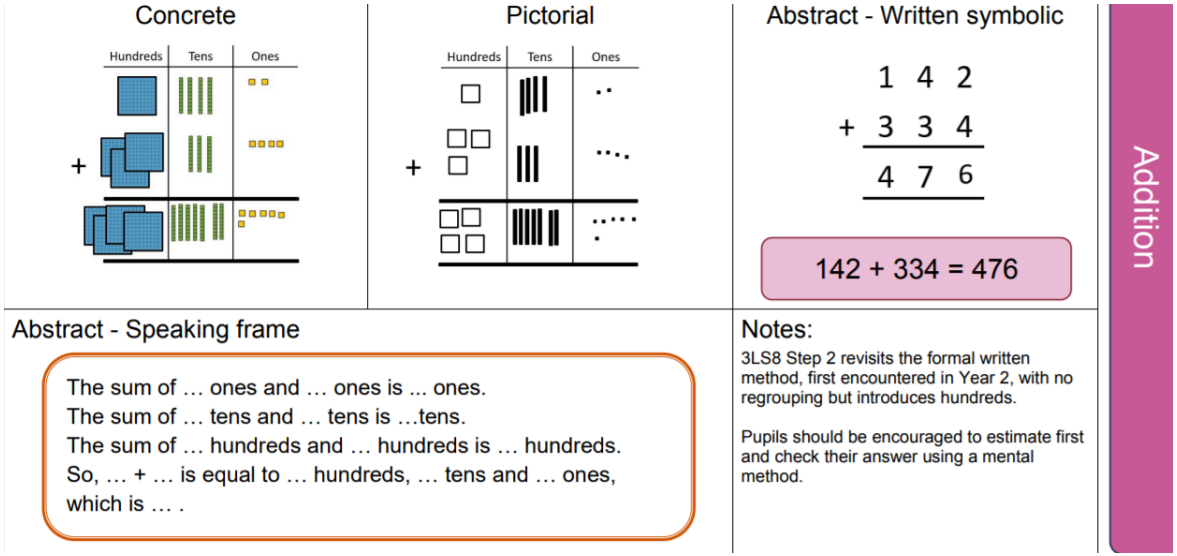
By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work. In June, all Year 4 pupils will sit a mandatory Multiplication Check Test.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

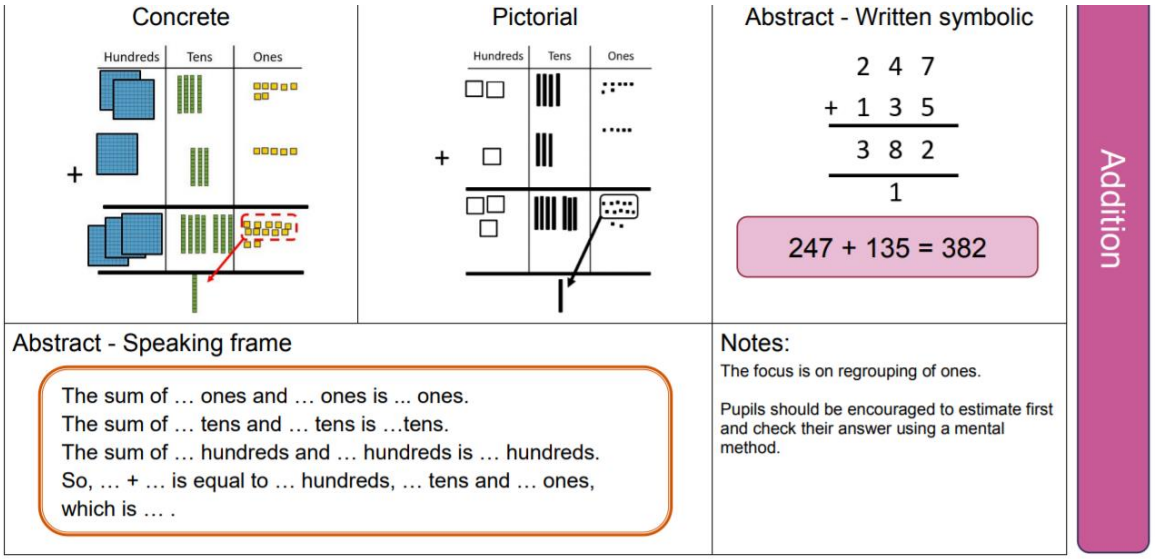
The examples below show what is expected in lower key stage 2 when pupils are adding, subtracting, multiplying and dividing using the concrete, pictorial and abstract methods. When talking through these operations with your child, please refer to these methods. If you need any further help or clarification please speak to your child's teacher. Please also refer to years 3 and 4's long-term plans, programme of study and the key concept and vocabulary maps, which can all be found under the 'Curriculum' section on the school website. These documents will show you the topics your child is learning and will ensure your child is familiar with the appropriate terminology for the relevant topics.

Please refer to the Key Stage 1 Parent support sheet for addition and subtraction methods and other key mathematical topics taught lower down the school.

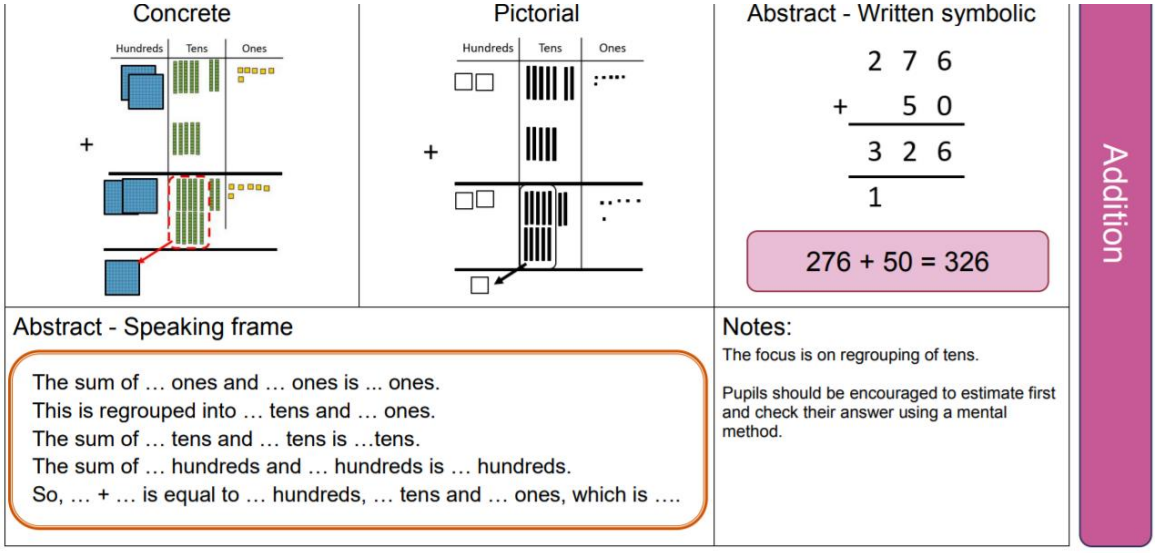
This example shows formal written method with no re-grouping (up to 3-digit numbers) -



This example shows formal written method with re-grouping of ones (up to 3-digit numbers) -

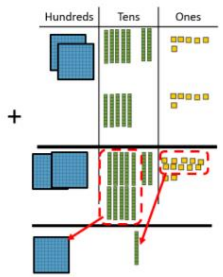


This example shows formal written method with re-grouping tens only (up to 3-digit numbers) -

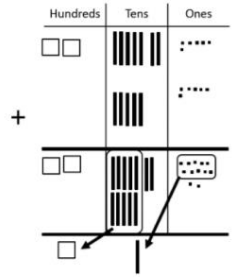


This example shows formal written method with re-grouping tens and ones (up to 3-digit numbers) -

Concrete



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} 2\ 7\ 6 \\ +\quad 5\ 6 \\ \hline 3\ 3\ 2 \\ \hline 1\ 1 \end{array}$$

276 + 56 = 332

Abstract - Speaking frame

The sum of … ones and … ones is ... ones.
This is regrouped into … tens and … ones.
The sum of … tens and … tens is …tens.
This is regrouped into … hundreds and … tens.
The sum of … hundreds and … hundreds is … hundreds.
So, … + … is equal to … hundreds, … tens and … ones, which is …

Notes:

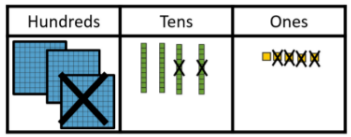
Pupils should be encouraged to estimate first and check their answer using a mental method.

Once pupils have fully understood and rehearsed regrouping within formal column addition of 3-digit numbers, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to 4-digit numbers, larger numbers, decimal numbers, money and measures.

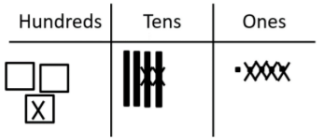
Addition

This example shows formal written subtraction with no re-grouping (up to 3-digit numbers) -

Concrete



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} 3\ 4\ 5 \\ -\ 1\ 2\ 4 \\ \hline 2\ 2\ 1 \end{array}$$

345 – 124 = 221

Abstract - Speaking frame

… ones take away … ones leaves … ones.
… tens take away … tens leaves … tens.
… hundreds take away … hundreds leaves … hundreds.
So, … – … is equal to … hundreds, … tens and … ones, which is …

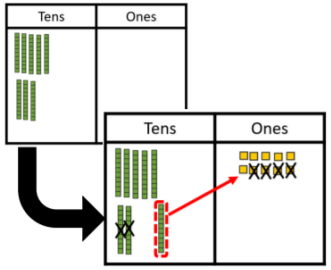
Notes:

Pupils should be encouraged to estimate first and check their answer using a mental method.

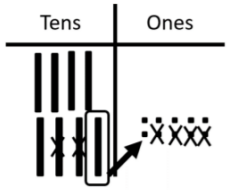
Subtraction

This example shows formal written subtraction with re-grouping tens into ones only (up to 3-digit numbers) -

Concrete



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} {}^{7}\cancel{8}\,{}^{1}0 \\ -\ 2\ 4 \\ \hline 5\ 6 \end{array}$$

80 – 24 = 56

Abstract - Speaking frame

I can see that there aren't enough ones for me to take away … ones without regrouping.
Regroup one ten into ten ones.
There are now … tens and … ones.
… ones take away … ones leaves … ones.
… tens take away … tens leaves … tens.
So, … – … is equal to… tens and … ones, which is … .

Notes:

It is important that pupils understand that 80 has been regrouped into 70 and 10. If pupils struggle with the compact notation refer to 2LS17 Step 5 for the expanded method.

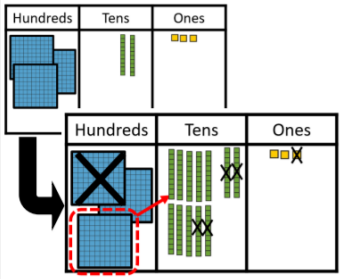
Speaking frame note:

"I can see that there aren't enough ones for me to take away 4 ones without regrouping. Regroup one ten into ten ones. There are now ten ones and zero ones. 10 ones take away 4 ones leaves six ones. 7 tens take away 2 tens leaves 5 tens. So, 80 – 24 is equal to 5 tens and 6 ones, which is 56."

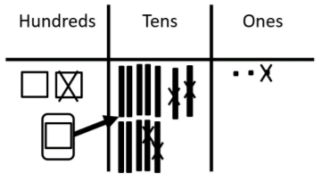
Subtraction

This example shows formal written subtraction with re-grouping hundreds into tens only (up to 3-digit numbers) -

Concrete



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} {}^{2}\cancel{3}\,{}^{1}2\ 3 \\ -\ 1\ 4\ 1 \\ \hline 1\ 8\ 2 \end{array}$$

323 – 141 = 182

Abstract - Speaking frame

… ones take away … ones leaves … ones.
I can see that there aren't enough tens for me to take away … tens without regrouping.
Regroup one hundred into ten hundreds.
There are now … hundreds and … tens.
… tens take away … tens leaves … tens.
… hundreds take away … hundreds leaves … hundreds
So, … – … is equal to … hundreds, … tens and … ones, which is ….

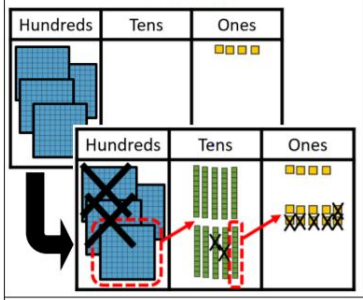
Notes:

It is important that pupils start to identify where regrouping is necessary.
Ensure that pupils are confident that the minuend may have been regrouped but it is still of equal value prior to subtraction.

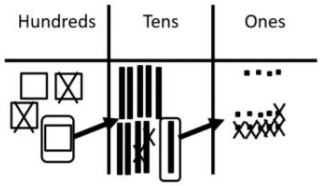
Subtraction

This example shows formal written subtraction re-grouping hundreds and tens (up to 3-digit numbers) -

Concrete



Pictorial



Abstract - Written symbolic

$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}\not{0}^{9}4 \\ -\ 2\ 2\ 6 \\ \hline 1\ 7\ 8 \end{array}$$

404 – 226 = 178

Abstract - Speaking frame

I will need to regroup…

- one hundred into ten tens. I now have … hundreds and … tens.
- one ten into ten ones. I now have … tens and … ones.

Notes:

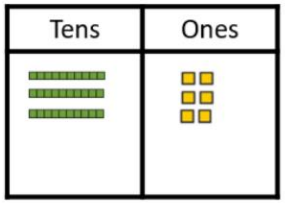
Speaking frame hint: This is not a complete speaking frame. It is structured to support pupils with the language of regroup only.

Once pupils have fully understood and rehearsed regrouping within formal subtraction, this learning continues to be rehearsed and applied throughout Years 4, 5 and 6, including to multi-digit, decimal numbers, money and measures.

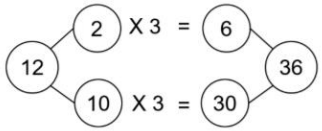
Subtraction

This method introduces the short multiplication method with no re-grouping -

Concrete



Pictorial - Jottings



Abstract - Written symbolic

$$\begin{array}{r} 1\ 2 \\ \times\quad 3 \\ \hline 3\ 6 \end{array}$$

12 x 3 = 36

Abstract - Speaking frame

… groups of … ones is … ones.
… groups of … tens is … tens.
… tens added to … ones is … .
The product of … and … is … .

Notes:

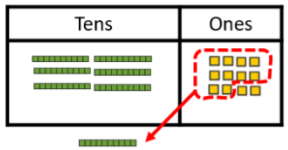
Pupils have already met the distributive law (3LS18) and rehearsed multiplying by ten (3LS25).
The focus of this step is support pupils in making the connection between informal distributive approach and the formal layout.

Speaking frame note:
"3 groups of 2 ones is 6 ones. 3 groups of 1 ten is 3 tens. 3 tens added 6 ones is 36. The product of 12 and 3 is 36."

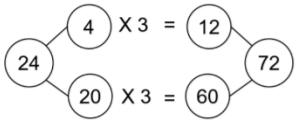
Multiplication

This method shows short multiplication method with regrouping of ones into tens only -

Concrete



Pictorial - Jottings



Abstract - Written symbolic

$$\begin{array}{r} 2\ 4 \\ \times\quad 3 \\ \hline 7\ 2 \\ \hline 1 \end{array}$$

24 x 3 = 72

Abstract - Speaking frame

… groups of … ones is … ones.
I can regroup the … ones into … ten(s) and … one(s).
… groups of … tens is … tens.
… ten(s) added to … is … .
The product of … and … is … .

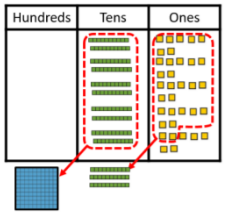
Notes:

Pupils have already met the distributive law (3LS18) and rehearsed multiplying by ten (3LS25).
The focus of this step is to support pupils in making the connection between informal distributive approach and the formal layout.
Speaking frame note:
"3 groups of 4 ones is 12 ones. I can regroup the 12 ones into 1 ten and 2 ones. 3 groups of 2 tens is 6 tens. 1 ten added to 6 tens is 7 tens. The product of 24 x 3 is 72."
Pupils should be encouraged to consider whether italicised language in the speaking frame is required in the calculation.

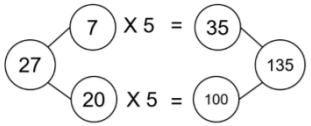
Multiplication

This method shows the short multiplication method with regrouping of tens and ones -

Concrete



Pictorial - Jottings



Abstract - Written symbolic

$$\begin{array}{r} 2\ 7 \\ \times\quad 5 \\ \hline 1\ 3\ 5 \\ \hline 3 \end{array}$$

27 x 5 = 135

Abstract - Speaking frame

… groups of … ones is … ones.
I can regroup the … ones into … ten(s) and … one(s).
… groups of … tens is … tens.
… ten(s) added to … ten(s) is ..
I can regroup the … tens into … hundred(s) and … ten(s)
The product of … and … is … .

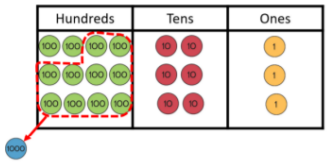
Notes:

At this stage, the pictorial representation is being used as a checking point to ensure pupils answer accurately. This allows focused attention on understanding the abstract recording.
Speaking frame note:
"5 groups of 7 ones is 35 ones. I can regroup the 35 ones into 3 tens and 5 ones. 5 groups of 2 tens is 10 tens. 3 tens added to 10 tens is 13 tens. I can regroup the 13 tens into 1 hundred and 3 tens. The product of 27 x 5 is 135."

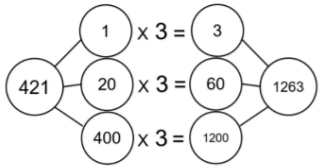
Multiplication

This method shows formal written multiplication with regrouping which generates a new column -

Concrete



Pictorial - Jottings



Abstract - Written symbolic

$$\begin{array}{r} 4\ 2\ 1 \\ \times \quad\ 3 \\ \hline 1\ 2\ 6\ 3 \end{array}$$

421 x 3 = 1263

Abstract - Speaking frame

… groups of … ones is … ones. *(Do I need to regroup?)*
… groups of … tens is … tens. *(Do I need to regroup?)*
… groups of … hundreds is … hundreds. (Do I need to regroup?)
(… hundreds can be regrouped to … thousands and … hundreds)
The product of … and … is … .

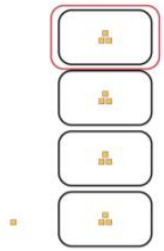
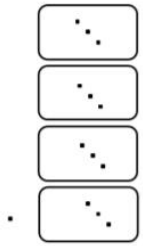
Notes:

At this stage, the pictorial representation is being used as a checking point to ensure that pupils answer accurately. This allows focused attention on understanding the abstract recording.

Pupils should be encouraged to consider whether the italicised language in the speaking frame is required in the calculation.

Multiplication

This example introduces the long division method (sharing ones) -

Concrete	Pictorial	Abstract - Written symbolic
		3 4 ⟌ 13 - 12 1 13 ÷ 4 = 3 r 1

Abstract - Speaking frame

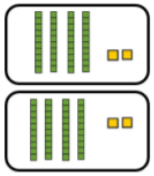
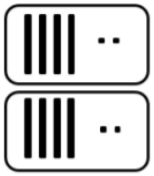
I am sharing … ones into … equal groups.
There are … ones in each group.
I have … one(s) remaining.
The quotient is … with … remainders.

Notes:

Pupils are introduced to the long division method for the first time in this sequence. Short division will not be introduced until pupils have understood all of the stages in this expanded form. In the calculation 96 ÷ 4, for example, pupils often struggle to understand that 1 ten will be regrouped after 8 tens have been used in the 4 groups. This is hidden in short division but recorded in long division.

Division

This example shows long division of tens and ones with no regrouping (sharing structure) -

Concrete	Pictorial	Abstract - Written symbolic
		4 2 2 ⟌ 8 4 - 8 0 4 4 0 84 ÷ 2 = 42

Abstract - Speaking frame

First, I am sharing … tens into … equal groups.
There are … tens in each group.
I have … ten(s) remaining.
Then, I am sharing … ones into … equal groups.
There are … ones in each group.
I have … one(s) remaining.
The quotient is … with … remainders.

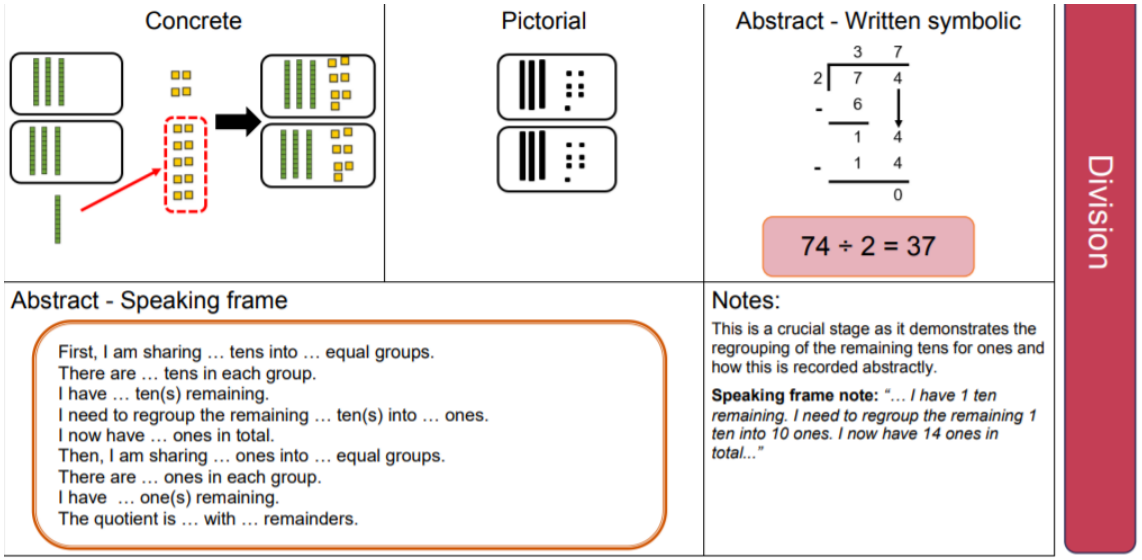
Notes:

This stage is to support pupils' understanding of the abstract notation. They learn to record how many tens are in each group, if there are any tens remaining and what the arrow means.

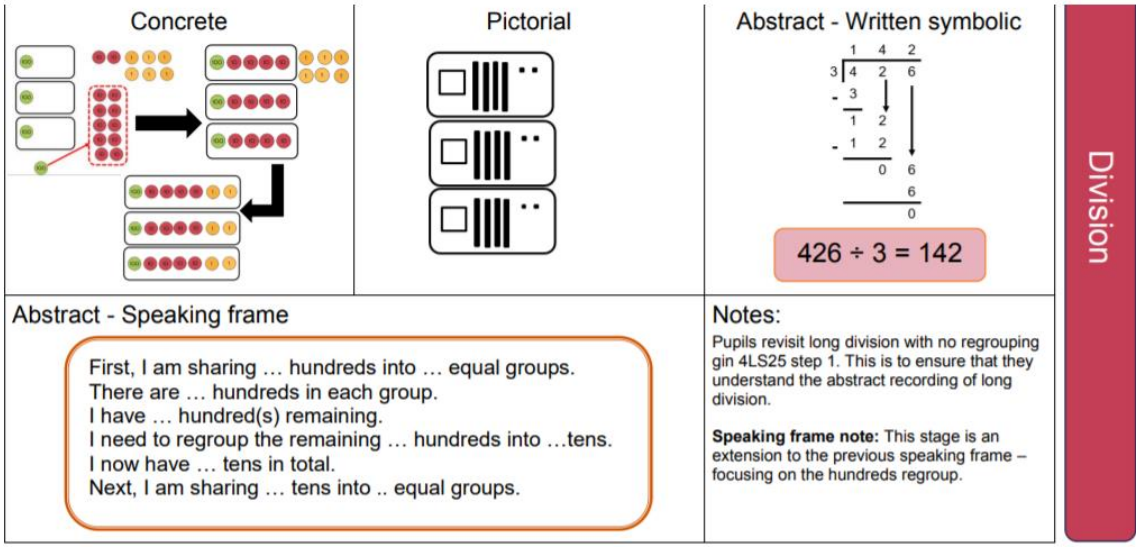
Speaking frame note: *"First, I am sharing 8 tens into 2 equal groups. There are 4 tens in each group. I have zero tens remaining. Then, I am sharing 4 ones into 2 equal groups. There are 2 ones in each group. I have zero ones remaining. The quotient is 42 with no remainders."*

Division

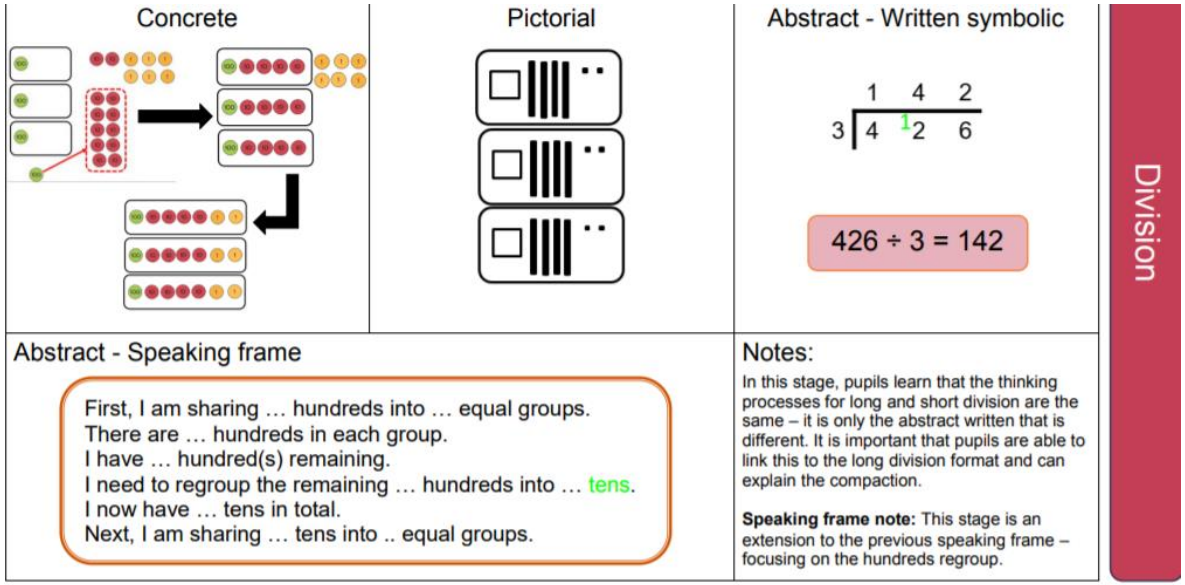
This example shows long division of tens and ones with regrouping (sharing structure) –



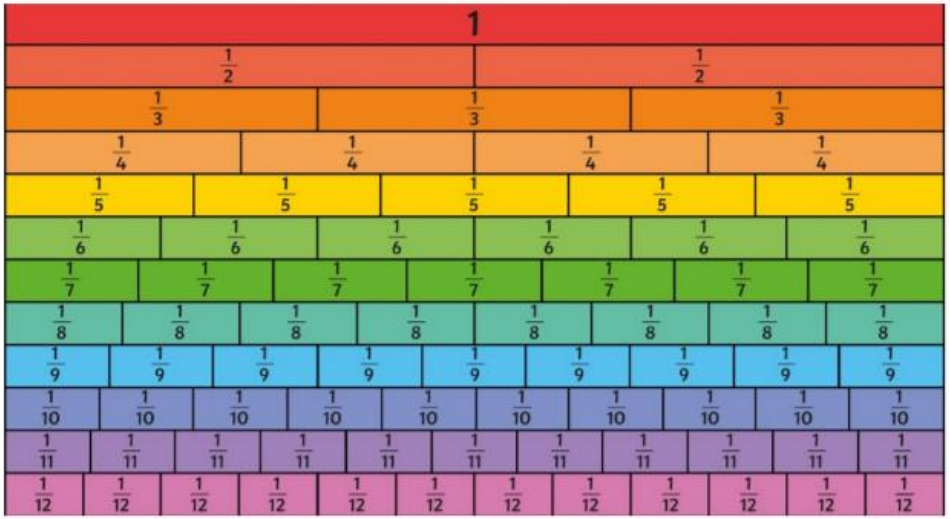
This example shows long division with regrouping hundreds into tens (sharing structure) -

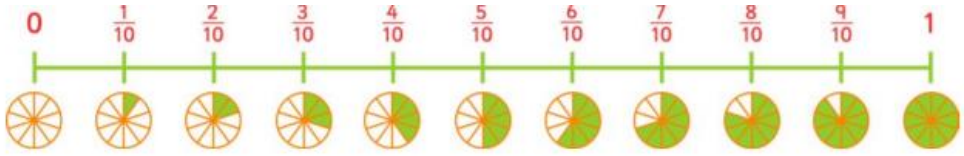


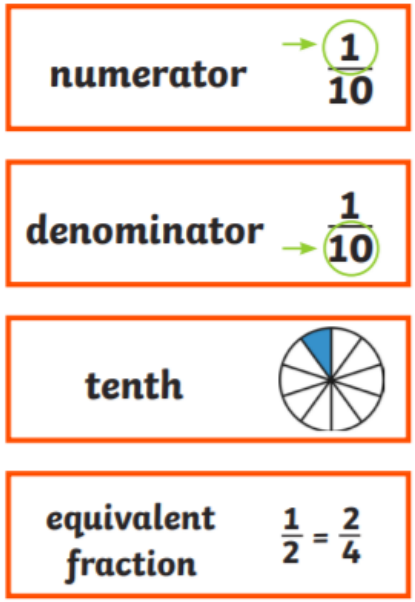
This example introduces short division (sharing structure) -



Fractions -







See key vocabulary map under 'Curriculum' section on the school website for fractions related vocabulary.

Decimal place value -

Decimal Square 0.01 to 1

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.70
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.80
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1

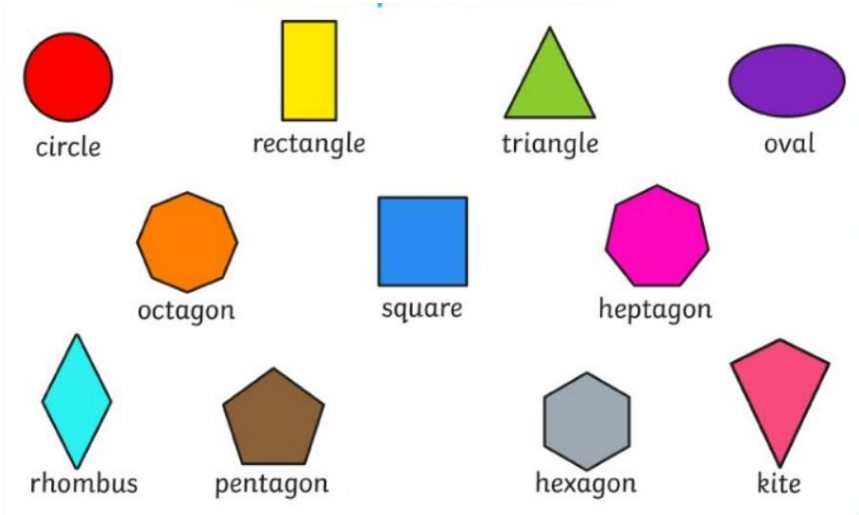
Tenths and Hundredths Place Value Grid				
Hundreds	Tens	Ones •	Tenths	Hundredths

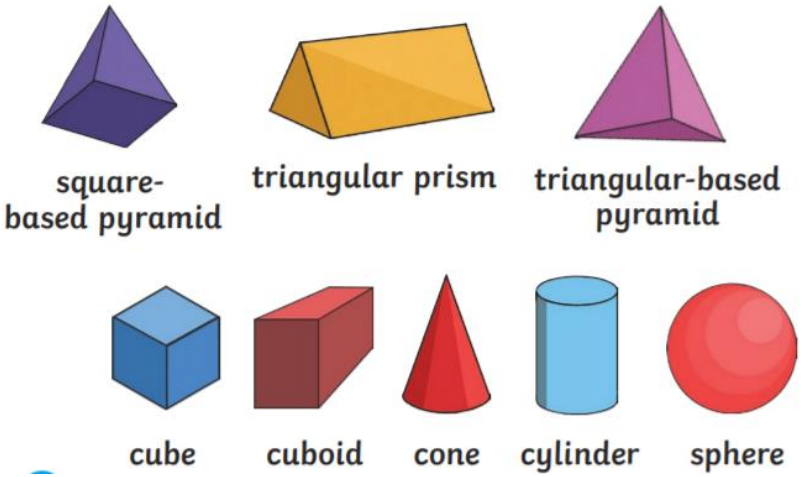
See key vocabulary map under 'Curriculum' section on the school website for decimal place value related vocabulary.

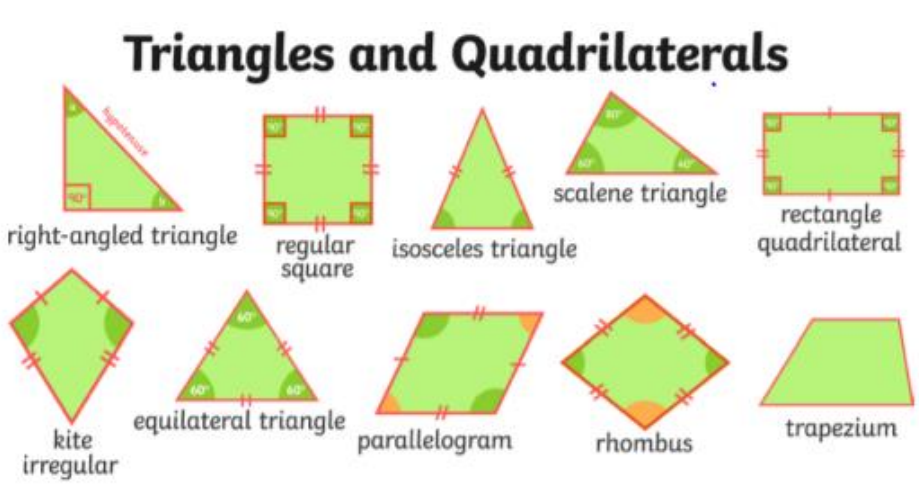
Properties of shapes –

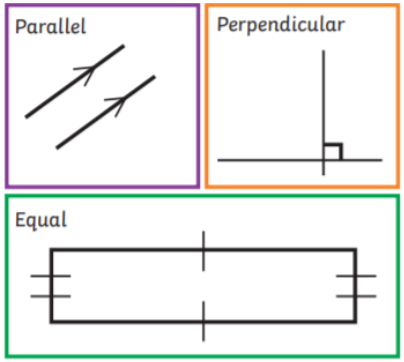
Key vocabulary required - Quadrilaterals, parallel, perpendicular, length, equal, sides, polygon, rectangle, square, circle, triangle, symmetry, straight side, curved side, right angle, obtuse (greater than a right angle), acute (less than a right angle), regular, irregular, congruent, rhombus, trapezium, parallelograms.

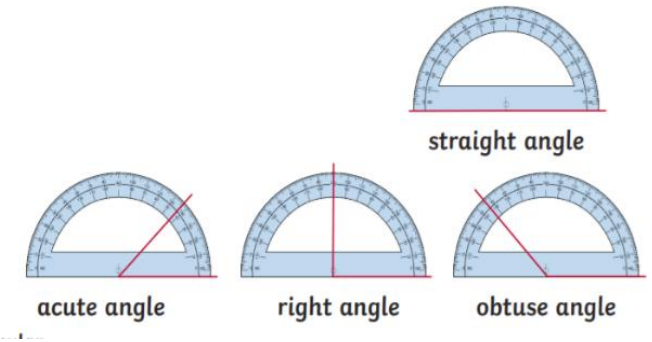
See key vocabulary map under 'Curriculum' section on the school website for further related vocabulary.







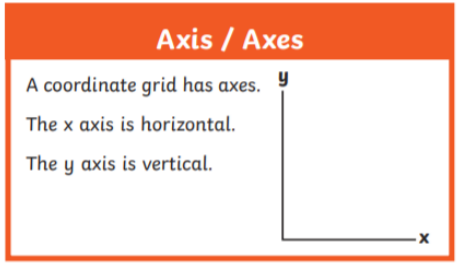


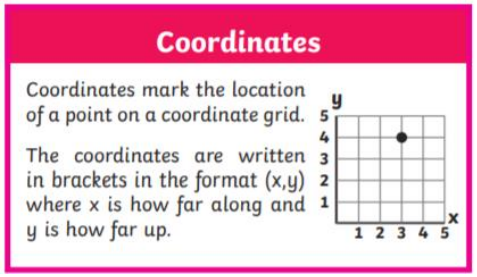


Geometry – coordinates –

Positions, translation, right, left, up, down, axes, x-axis, y-axis, whole numbers, integers, co-ordinates, movements, 2-dimensional, vertices, vertex, units, reflected, rotated, symmetry, values, quadrant, plot.

See key vocabulary map under 'Curriculum' section on the school website for further related vocabulary.





Measuring –

1cm = 10mm

1m = 100cm

1kg = 1000 grams

1km = 1000 m

Mass- a measure of the amount of matter (stuff) contained in an object

Weight – the force at which an object is pulled down towards earth

Capacity – the ability to contain something

Volume - the amount of space that a substance or object occupies

Newton – a unit of force

Nanoseconds - one thousand-millionth of a second

See key vocabulary map under 'Curriculum' section on the school website for further related vocabulary.

Telling the time –

Key vocabulary required - hour, minutes, seconds, days, midday, midnight, o'clock, quarter, half, three-quarters, past, to, clockwise, anti-clockwise, analogue, digital, Roman numerals, am, pm, later, earlier.

See key vocabulary map under 'Curriculum' section on the school website for further related vocabulary.

Roman numerals - 0-100

I	II	III	IV	V	VI	VII	VIII	IX	X
XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX	XXX
XXXI	XXXII	XXXIII	XXXIV	XXXV	XXXVI	XXXVII	XXXVIII	XXXIX	XL
XLI	XLII	XLIII	XLIV	XLV	XLVI	XLVII	XLVIII	XLIX	L
LI	LII	LIII	LIV	LV	LVI	LVII	LVIII	LIX	LX
LXI	LXII	LXIII	LXIV	LXV	LXVI	LXVII	LXVIII	LXIX	LXX
LXXI	LXXII	LXXIII	LXXIV	LXXV	LXXVI	LXXVII	LXXVIII	LXXIX	LXXX
LXXXI	LXXXII	LXXXIII	LXXXIV	LXXXV	LXXXVI	LXXXVII	LXXXVIII	LXXXIX	XC
XCI	XCII	XCIII	XCIV	XCV	XCVI	XCVII	XCVIII	XCIX	C

Statistics –

Key vocabulary required - Bar charts, intervals, data, same, different, scale, value, discrete, continuous, relationship, maximum, minimum, constant, variables, increase, decrease, line graphs, bar graphs, axes, x-axis, y-axis, time, distance, pictogram, carroll diagram, venn diagram.

See key vocabulary map under 'Curriculum' section on the school website for further related vocabulary.

Continuous data – is data that can take any value, e.g. temperature, height, length etc.

Discrete data – is data that can only take certain values, e.g. the number of people in a class, test questions answered correctly etc.

Table

A table is used to record information and collect results.

The information can then be used to make pictograms or block diagrams to display results clearly.

A table needs to have headings to show what you are measuring or recording.

Favourite Animal	Number of Children
Dog	10
Cat	8
Snake	2
Bear	4
Horse	6
Goose	0

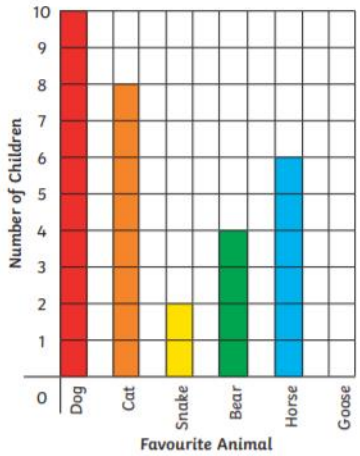
Bar Chart

A bar chart is used to clearly display results and information.

Types of items are shown on the x-axis, which is horizontal.

The number of items are shown on the y-axis, which is vertical.

One block represents one item. It is quicker to compare results using a block diagram than a table or tally chart.



Carroll Diagram

A Carroll diagram is a table used for sorting objects based on whether they do or do not meet two given criteria.

Carroll diagrams were invented by Lewis Carroll, the author of 'Alice in Wonderand'.

	Red	Not Red
Quadrilateral		
Not a Quadrilateral		

Examples of discrete data

Tally Chart

A tally chart is used for counting how many of something you are recording.

1 tally mark shows you that there is 1 item.

4 tally marks with a diagonal line through them show you that there are 5 items.

In this example, the tally marks show how many children chose each of the animals as their favourite in a survey.

Making a tally chart is faster than writing out words or numbers.

Favourite Animal	Number of Children	Frequency
Dog	𝍸 𝍸	10
Cat	𝍸 |||	8
Snake	||	2
Bear	||||	4
Horse	𝍸 |	6
Goose		0

Pictogram

A pictogram uses pictures to represent data.

It is quicker and easier to interpret the results in a pictogram than in a table or tally chart.

Pictograms are set out in a similar way to bar charts, but instead of bars they use columns of pictures to show specific amounts.

Favourite Animal	Number of Children
Dog	
Cat	
Snake	
Bear	
Horse	
Goose	

 = 2 children

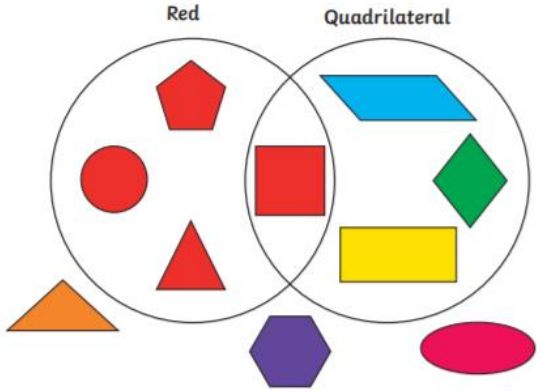
Venn Diagram

A Venn diagram is a diagram used to sort objects based on different criteria.

A Venn diagram is made up of two or more overlapping circles.

Objects placed in the section where the circles cross over meet both criteria.

Objects outside of the circles don't meet either set of criteria.



An example of continuous data -

Here is a line graph which shows the change in temperature over twelve months.