



Parents' Numeracy Handbook

Maths at home



DO's



DONT's

Do

- Make maths fun.
- Encourage children to have a go.
- Praise achievements, however small.
- Encourage children to talk about how they work things out.
- Remember that asking questions is as important as finding answers.
- Work together for short sessions (little and often).
- Stop as soon as either of you has had enough!

Don't

- Put children under too much pressure.
- Pass on negative feelings you may have about maths.
- Rush your child's learning.
- Worry about mistakes; we learn by taking risks and getting things wrong sometimes.
- Jump in too quickly with the answer. Encourage your child to solve problems for themselves.
- Continue if your child is finding the activity too hard.

Websites for parents/carers

National Numeracy Parent Toolkit has a wealth of tips and advice for parents.

<http://www.nnparenttoolkit.org.uk/>

Oxford Owl includes a range of activities, top tips and eBooks to help your child with their maths at home.

<http://www.oxfordowl.co.uk/maths-owl/maths>

Maths 4 Mums and Dads explains some of the milestones children make between the ages of 3-and-11-years-old.

<http://www.maths4mumsanddads.co.uk/index.php>

Nrich. A range of maths games, problems and articles on all areas of maths. Parents of Key Stage 1 children should select 'stage 1' and parents of Key Stage 2 children should select 'stage 2'.

<http://nrich.maths.org/frontpage>

List of Maths websites for children

<http://amathsdictionaryforkids.com/>

<http://www.bbc.co.uk/bitesize/ks1/maths/>

<http://www.bbc.co.uk/bitesize/ks2/maths/>

<https://online.espresso.co.uk>

<http://www.ictgames.com/resources.html>

<http://www.ilovemathsgames.com/>

<http://www.mathsisfun.com/index.htm>

<http://www.mathszone.co.uk/>

<http://www.multiplication.com/>

<http://www.primarygames.co.uk/>



GLOSSARY

Some definitions of words you may hear used from mathematics lessons or in homework.

Angles	There are 4 types of angles: acute angles are more than 0° but less than 90° ; obtuse angles are greater than 90° but less than 180° ; reflex angles are angles that are greater than 180° ; and right angles are equal to 90°
Area	Is the amount of surface space inside the perimeter. It is measured in squares.
Averages	There are 3 different types of average: mean average is the sum of all the values divided by their quantity; median average is the middle value of a set of numbers when they have been put into size order; and the mode average is the value that occurs most often in a set of numbers.
Decomposition	The standard paper and pencil method of subtraction involving the exchange of place value numbers.
Equilateral	A shape that has equal length sides and equal size angles.
Factor	A number that can be divided into a said number e.g. 1,2,3,4,6 and 12 are all factors of 12.
HT and ones	Hundreds Tens and Ones (HTO/ HTU)
Horizontal	A perfectly flat line i.e. the horizon
Integer	A whole number
Inverse	The opposite operation i.e. + is the inverse of – and x is the inverse of \div .
Multiple	A whole number which can be divided exactly by another number e.g. 30 is a multiple of 5 and 600 is a multiple of 6, 100 and 2
Partition	To split the number up into place values e.g. 123 partitioned is $100 + 20 + 3$
Perimeter	Is the distance all the way round the edge of something.
Prime number	A prime number is a number that only has 2 factors i.e. it can only be divided by itself and 1.
Product	To multiply e.g. the product of 2 and 3 is 6.
Proportion	Is used to compare two things e.g. 1 out of every 2 children in a class is a boy or $\frac{1}{2}$ are boys.
Ratio	Is another way of comparing things e.g. the ratio of boys to girls in a class might be 1:1
Significant figure	The specific place value e.g. in the number 1234 the 1000 is the most significant figure and 4 is the least significant.
Vertex	Is the corner of a 2D shape.
Vertical	Straight up e.g. a vertical goal post.

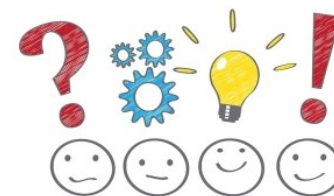
Questions that can help to extend children's thinking

If they get stuck:

- Can you describe the problem in your own words?
- Can you talk me through what you have done so far?
- What did you do last time? What is different this time?
- Is there something that you already know that might help?
- Could you try it with simpler numbers / fewer numbers / using a number line?
- What about putting things in order?
- Would a table / picture / diagram / graph help?
- Why not make a guess and check if it works?

After you have done some work:

- How did you get your answer?
- Can you explain why it works?
- What could you try next?
- Would it work with different numbers?
- What if you had started with ... rather than ... ?
- What if you could only use ...?
- Is it a reasonable answer / result? What makes you say so? How did you check it?
- Did you use any new words today? What do they mean? How do you spell them?



Useful equipment for Maths at home:

- Counters / cubes / small objects which do not roll (in at least 2 different colours)
- Dice – make your own or buy them from a toy shop (they are available with 6, 8, 10, 12 and 20 faces and a variety of numbers)
- A simple calculator or scientific calculator for older children
- 100 square
- Tables Square
- Digit cards (0 to 9) – it is easy to make your own!
- Number line – you can use a rule for numbers up to 30 (or 300 if you use the millimetres side)



100 Square									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80

The chunking method – is the next step.

This method involves the children taking away “chunks” of knowledge that they are confident with. They are encouraged to brainstorm facts that they know before starting the calculation (for instance knowing that $10 \times 8 = 80$ therefore $20 \times 8 = 160$ etc)

$$174 \div 8 =$$

$$734 \div 9 =$$

$$\begin{array}{r} 8 \overline{) 174} \\ - 80 \quad (10 \times 8) \\ \hline 94 \\ - 80 \quad (10 \times 8) \\ \hline 14 \\ - 8 \quad (1 \times 8) \\ \hline 6 \end{array}$$

$$\begin{array}{r} 9 \overline{) 734} \\ - 450 \quad (50 \times 9) \\ \hline 284 \\ - 180 \quad (20 \times 9) \\ \hline 104 \\ - 99 \quad (11 \times 9) \\ \hline 5 \end{array}$$

Add up the multiples of 8.

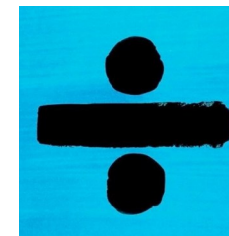
Add up the multiples of 10

The answer is 21 remainder 6.

The answer is 81 remainder 5

Key vocabulary:

divide
share
division
remainder
left over
exact
multiple



Written Methods

Recording Division

Pupils will be introduced to division using a wide range of practical activities involving sharing to reinforce their understanding

They will then develop their understanding of recording

$$\begin{array}{r} 31 \\ 3 \overline{) 93} \end{array}$$

Use multiplication to check division

$$\begin{array}{r} 31 \text{ rem } 2 \\ 3 \overline{) 95} \end{array}$$

$$\begin{array}{r} 31 \\ \times 3 \\ \hline 93 \end{array} + 2 = 95$$

$$\begin{array}{r} 202 \text{ rem } 1 \\ 4 \overline{) 809} \end{array}$$

$$\begin{array}{r} 1112 \text{ rem } 2 \\ 6 \overline{) 6674} \end{array}$$

Use multiplication to check division

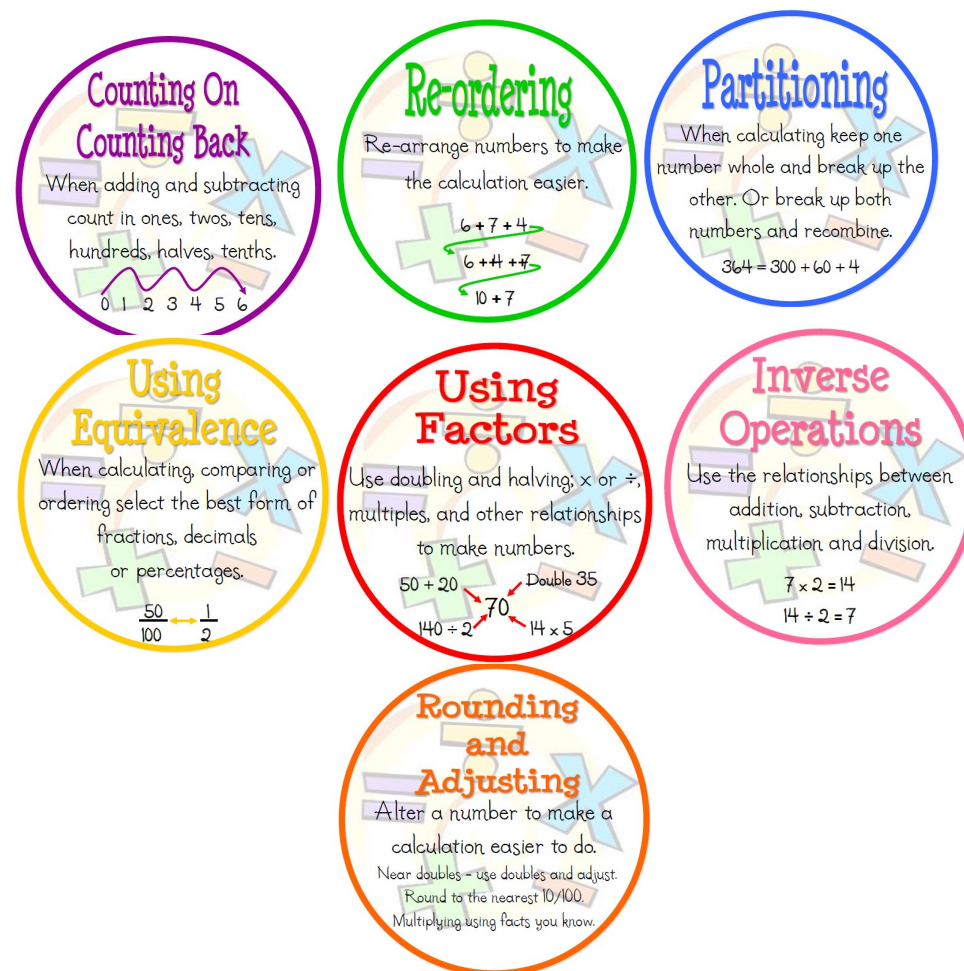
$$\begin{array}{r} 829 \text{ rem } 3 \\ 9 \overline{) 7464} \end{array}$$

$$\begin{array}{r} 829 \\ \times 9 \\ \hline 7461 \end{array} + 3 = 7464$$

Mental Maths Strategies

The ability to perform mental calculations is a key skill of being numerate. Children in Clandeboy Primary School have the opportunity to experience a rich programme of mental maths activities. They are given time to develop and discuss the strategies they use so that they learn to calculate accurately and efficiently.

The 7 mental maths strategies are:



Mental Strategies—Addition

Mental Math



Adding on – Relate addition to combining two groups in practical situations and begin to use the correct mathematical vocabulary. The children add one more number onto a unit. E.g. 2 add 1 = 3.

Counting on – The children hold one number in their head or use a visual stimulus such as a number line using their fingers and counting on.

Using a known fact – The children give a rapid response to a known fact.

Number Bonds – The children are expected to learn number bonds (pairs of numbers) that make firstly 10 and 20 then later to 100, and recall them immediately – e.g. 7 and 3. The level of difficulty progresses so that in KS2 children can use number bonds with decimals.

Using a derived fact – The children use a known fact to work out a new one. For example, $16 + 4 = 20$, so $17 + 4$ must be 21 or $6 + 4 = 10$ so $60 + 40 = 100$. They will also be taught that the = sign does not always appear at the end of a calculation and that $10 = 6 + 4$ is valid as is $7 + 3 = 14 - 4$. Children will also learn to add in 10's from any number.

Hundred squares – A child will respond to questions like $40 + 50$ or $52 + 30$ by using their knowledge of multiples of 10, and some children will do this by using a number square.

Adding several numbers – The children should look for pairs of numbers that make 10 and use these first. They are also taught to start with the largest number and are also aware that they can find pairs that make 9 or 11 and add these by adding 10 and then adjusting by 1.

Partitioning and recombining – This is when children break 6, 7, 8 and 9 into '5 and a bit' e.g. $7 = 5 + 2$.

This moves on to 2 and 3 digit numbers when the children are ready. For example, the children will work out mentally that: $55 + 16 = 55 + 15 + 1 = 70 + 1 = 71$

Partitioning in tens and ones – Partitioning is splitting numbers up. The children would add the tens together first, then add the ones and then add the two results.

For example: $36 + 53 = (30 + 50) + (6 + 3) = 80 + 9 = 89$

Some children will only partition the numbers they are adding on.

For example: $36 + 53 = 36 + 50 + 3 = 86 + 3 = 89$

Bridging 10 – Once the children are confident with adding up to 10 they are taught to bridge 10.

$7 + 5$ aiming for 10 first becomes $7 + 3 + 2$

Adding near multiples of 10 – This works on the basis that to add 9 is the same as to add 10 and then subtract 1. It is a mental strategy that the children should be able to operate in their heads. For example:

$43 + 9 = (43 + 10) - 1 = 53 - 1 = 52$

$86 + 39 = (86 + 40) - 1 = 126 - 1 = 125$

The Grid method

	79×27		
	70	9	
20	1400	180	1400 490 180 + 63 2133
7	490	63	

$$\begin{array}{r} 72 \\ \times 47 \\ \hline 2880 \text{ (72} \times 40\text{)} \\ + 504 \text{ (72} \times 7\text{)} \\ \hline 3384 \text{ (72} \times 47\text{)} \end{array}$$

For-

of
mul-

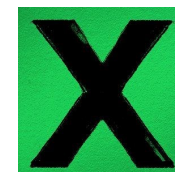
$$\begin{array}{r} 263 \\ \times 47 \\ \hline 2630 \text{ (263} \times 10\text{)} \\ + 1841 \text{ (263} \times 7\text{)} \\ \hline 4471 \text{ (263} \times 17\text{)} \end{array}$$

mal re-
coding
long

multiplication

Key vocabulary:

groups of, times, multiply
long multiplication
product of
multiple
factors
approximately



When multi-
plying

Written Methods

Recording Multiplication

Pupils will be introduced to multiplication using a wide range of practical activities to reinforce their understanding. They will then explore horizontal multiplication of TU by 2, 3, 4, 5 e.g. $43 \times 3 = 120 + 9 = 129$
 $(40+3) \times 3 = (40 \times 3) + (3 \times 3)$

They will then develop vertical recording of multiplication

43×3	
	$40 + 3$
$\times 3$	$120 + 9 = 129$

$$\begin{array}{r} 43 \\ \times 2 \\ \hline 86 \end{array}$$

$$\begin{array}{r} 24 \\ \times 14 \\ \hline 96 \end{array}$$

$$\begin{array}{r} 478 \\ \times 334 \\ \hline 1912 \end{array}$$

By upper KS2 children will develop a range of strategies including:

Using factors

$$39 \times 28$$

$$\begin{array}{r} 39 \\ \times 67 \\ \hline 273 \\ \times 214 \\ \hline 1092 \end{array}$$

Mental Strategies—Subtraction

Relate subtraction to taking away in practical situations, physically taking objects away and begin to use the correct mathematical vocabulary.

Taking away (when only a small difference is involved) – A child finding $9 - 3$ holds up nine fingers and folds down three.

Number Bonds – The children are expected to learn number bonds to 10 and 20 and can use these for subtraction. For example, if $6 + 4 = 10$ then $10 - 4 = 6$.

Using derived facts – If the children know that $20 - 7 = 13$, then $21 - 7$ must be 14.

Partitioning into tens and ones – Partitioning is splitting numbers up. For example, 57 could be partitioned into 50 and 7.

The children partition numbers to make separate subtraction sums, and then add the results together.

$$47 - 24 = (40 \text{ and } 7) - (20 \text{ and } 4)$$

$$40 - 20 = 20$$

$$7 - 4 = 3$$

$$\text{so } 20 + 3 = 23$$



Some children will only partition the number that they are subtracting: $47 - 24 = 47 - 20 - 4 = 27 - 4 = 23$

Partitioning can be extended to thousands and also decimals as the children progress through the school.

Subtraction compensation– This is a mental strategy that works on the basis that to subtract 9 is the same as subtracting 10 and adding 1. For example:

$$54 - 9 = (54 - 10) + 1 = 44 + 1 = 45$$

$$76 - 39 = (76 - 40) + 1 = 36 + 1 = 37$$

$$438 - 199 = (438 - 200) + 1 = 238 + 1 = 239$$

If the children don't like the numbers that they are working with then they can change them by adding or subtracting an amount to make one of the numbers more manageable (as long as they remember to take the number away again at the end.)

For example: $83 - 47$: it is easier to subtract 50, so add 3 to 47.

$83 - 50 = 33$ remember we have taken away 3 too many so we need to add 3 back on $33 + 3 = 36$

$632 - 84$: it is easier to subtract 100 so add 16 to 84.

$632 - 100 = 532$ add 16 back on so $532 + 16 = 548$

Subtracting decimals – children learn to subtract decimals with either 1 or 2 decimal places (d.p.) – that is numbers after the decimal point.

Missing numbers – Children are taught how to solve missing number calculations

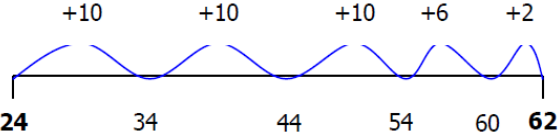
Use of empty number line

Blank number lines are an important and effective tool for children. They can be used to help as children move from using prepared number lines with markings to more standard written forms of calculation. Children find them useful developing a feeling for the size of a number

Example 1: Addition

$$24 + 38$$

so $24 + 38 = 62$

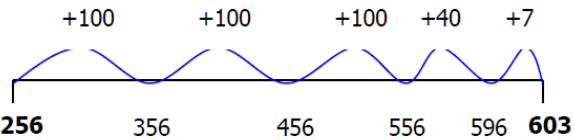


A horizontal number line starting at 24 and ending at 62. There are five jumps: +10, +10, +10, +6, and +2. The numbers 24, 34, 44, 54, 60, and 62 are marked below the line.

Example 2: Addition

$$256 + 347$$

so $256 + 347 = 603$



A horizontal number line starting at 256 and ending at 603. There are five jumps: +100, +100, +100, +40, and +7. The numbers 256, 356, 456, 556, 596, and 603 are marked below the line.

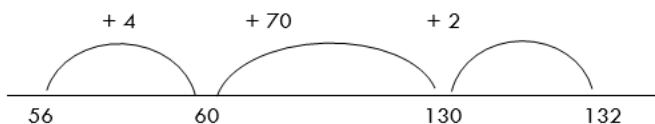
and how different numbers relate to each other.

Subtraction—through counting on

A classic example is $1002 - 999$ is much easier to count on 3 than counting back. Children need to learn to look at the sum and think about the most appropriate method to use.

This is subtraction by addition! The children start with the lowest of the two numbers and count up to the highest. It is easier to count up to the next multiple of 10, then the multiple of 10 immediately before the

$$132 - 56$$



highest number and then finally to the highest number itself e.g. The children are then left with a simple addition sum to complete the question:

$$70 + 4 + 2 = 76 \text{ and therefore } 132 - 56 = 76$$

Then move on to vertical subtraction with exchange by decomposition.

$$\begin{array}{r} \text{T U} \\ 4 \text{ } 12 \\ \cancel{5} \cancel{2} \\ - 28 \\ \hline 24 \end{array}$$

$$\begin{array}{r} \text{Th H T U} \\ 5 \text{ } 12 \text{ } 6 \text{ } 11 \\ \cancel{6} \cancel{2} \cancel{7} \cancel{1} \\ - 2644 \\ \hline 3627 \end{array}$$

Key vocabulary:

horizontal

vertical

estimate

calculate mentally

subtract / minus/ take away

difference between

Units/ones, tens, hundreds, thousands

How many units to make...?

How many tens to make..?

Exchange

decomposition



Written Methods

Recording Subtraction

Pupils will begin to record subtraction of any two 2-digit numbers horizontally and express their recording so that it reflects their thinking.

Encourage children to develop the strategy of estimating before calculating.

$$82 - 26 = 82 - 20 - 6$$

$$82 - 20 = 62$$

$$62 - 6 = 56$$

$$71 - 19 = 71 - 20 + 1$$

$$71 - 20 = 51$$

$$51 + 1 = 52$$

1. Partitioning – link with mental methods

$$86 - 53 = 80 + 6 - 50 - 3 = (80 - 50) + (6 - 3) = 30 + 3 = 33$$

Starting to lay out the numbers vertically. This is an introduction to decomposition (see right hand column)

Example 1 563 - 241 :

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 40 + 1 \\ \hline 300 + 20 + 2 = 322 \end{array}$$

$$\begin{array}{r} 563 \\ - 241 \\ \hline 322 \end{array}$$

Before formal recording of the following pupils will be given opportunities to show understanding of place value through games and mental activities.

Pupils will begin with vertical subtraction with no exchange

$$\begin{array}{r} \text{T U} \\ 76 \\ - 45 \\ \hline 31 \end{array}$$

Bridging 10- Once the children are confident with adding up to 10 they are taught to bridge 10.

7 + 5 aiming for 10 first becomes 7 + 3 + 2

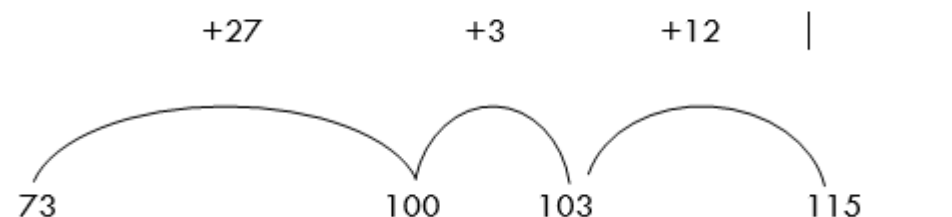
Bridging 100 -- Once the children are confident with adding up to 100 they are taught how to bridge significant digits 10's 50 and 100 etc.

70 + 39 aiming for 100 first

$$70 + 30 = 100 \quad 100 + 9 = 109$$

73 + 42 = aiming for 100

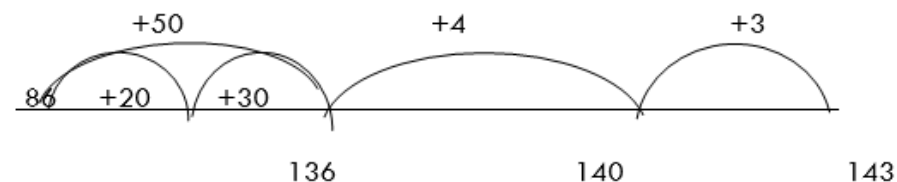
Start with 73



Counting on in multiples of 100, 10 or 1

The children start with the lowest number and count on by partitioning the second number and adding the tens and then the ones, which can be split to make the sum easier. For example:

$$\begin{aligned} 86 + 57 &= 86 + 50 + 7 \\ &= 86 + 20 + 30 + 4 + 3 \end{aligned}$$



Written Methods

Recording Addition

Pupils will begin to record addition of any two 2-digit numbers horizontally and express their recording so that it reflects their thinking. This should be understood before moving on to re-

ver- **42 + 45 =** 40 + 40 + 5 + 2 **80 + 7 = 87** recording
tically.

Partition both numbers
and recombine

$$\begin{aligned} 34 + 27 &= 34 + 20 + 7 \\ 34 + 20 &= 54 \\ 54 + 7 &= 61 \end{aligned}$$

Keep one number intact
and partition the other
number

$$\begin{aligned} 63 + 19 &= 63 + 20 - 1 \\ 63 + 20 &= 83 \\ 83 - 1 &= 82 \end{aligned}$$

Use rounding and
adjusting

$$\begin{array}{r} 67 \\ + 56 \\ \hline 110 \quad (60 + 50) \\ 13 \quad (7 + 6) \\ \hline 123 \end{array}$$

This method links closely to mental calculations. When calculating in their heads, children are taught to add the tens first, as it gives a clue to the size of the answer.

$$\begin{array}{r} 437 \\ + 586 \\ \hline 900 \quad (400 + 500) \\ 110 \quad (30 + 80) \\ 13 \quad (7 + 6) \\ \hline 1023 \end{array}$$

Here the same method is used for adding hundreds.

Before formal recording of the following opportunities will be given to show understanding of place value through games

$$\begin{array}{r} \text{TU} \\ 52 \\ + 26 \\ \hline 78 \end{array} \quad \begin{array}{r} \text{TU} \\ 43 \\ + 37 \\ \hline 80 \end{array} \quad \begin{array}{r} \text{TU} \\ 76 \\ + 55 \\ \hline 131 \end{array}$$

$$\begin{array}{r} \text{HTU} \\ 251 \\ + 624 \\ \hline 875 \end{array} \quad \begin{array}{r} \text{HTU} \\ 183 \\ + 466 \\ \hline 649 \end{array} \quad \begin{array}{r} \text{HTU} \\ 386 \\ + 539 \\ \hline 925 \end{array}$$

By upper KS2 pupils will be expected to apply knowledge of place value to work out addition calculations

e.g. $417 + 3.49 + 27.8$

$$\begin{array}{r} 417.00 \\ 3.49 \\ + 27.80 \\ \hline 448.29 \end{array}$$

A combination of mental and written calculations should be used where possible e.g

To solve
lowing:

$$370 + 56.93 + 9.8$$

$$370 + 9.8 \text{ (mental calculation)} = 379.8$$

$$379.8 + 56.93 \text{ (written calculation)}$$

the fol-

Key vocabulary:

How many to make

Partition

Tens, units/ones, hundreds, thousands

Exchange

Estimate

Equals

