



Funded by
Department
for Education

English Hubs
St John Vianney English Hub

St John Vianney Catholic Primary School

Seeking Growth Together through Jesus

Executive Headteacher: Dr Elaine Allen

Head of School: Mrs Clare Evans

Year 3 and 4

Parents' Calculation Workshop

Aims and objectives

- To share with parents the school's calculation policy
- To share with parents the strategies and method employed at school so that they are mirrored at home.
- To give parents the knowledge and skill to develop their children's understanding of calculation methods.
- To highlight to parents other areas that would lead to a mastery of calculation related to the phase their child/children are in

Addition

Year 3 Column method- regrouping with up to 3 digits and carrying

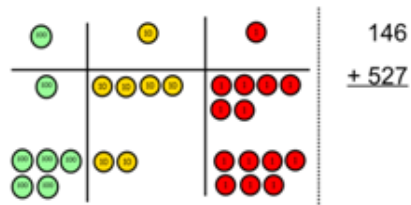
Add and subtract numbers mentally, including:
i. a three-digit number and ones
ii. a three-digit number and tens
iii. a three-digit number and hundreds.

Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

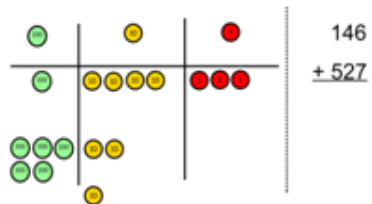
Estimate the answer to a calculation and use inverse operations to check answers.

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

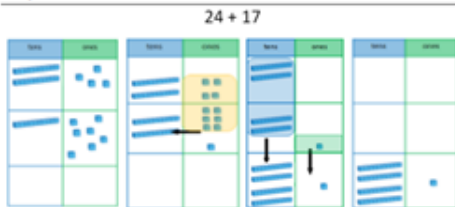
Make both numbers on a place value grid.



Add up the units and exchange 10 ones for one 10.



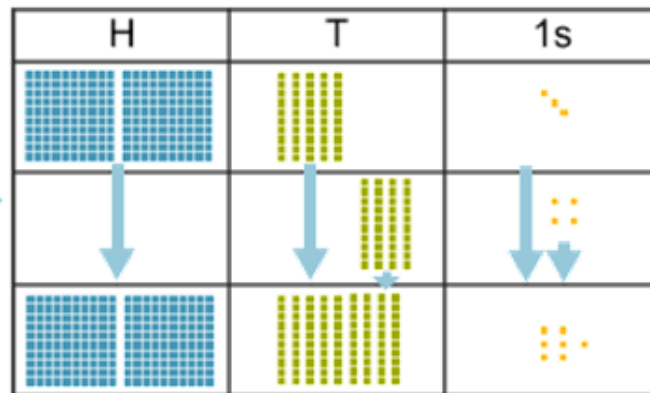
Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.



$$\begin{array}{r} \text{Tens} \quad \text{Ones} \\ 24 \\ + 17 \\ \hline 41 \end{array}$$

First add the ones.
Re-group 10 ones to 1 ten.
Next add the tens.

Draw representations of 3 digit column addition both with and without carry.



Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

$$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ \hline 60 + 13 = 73 \end{array}$$

$$\begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$$

Year 4 Column method- regrouping with up to 4 digits and carrying

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Estimate and use inverse operations to check answers to a calculation.

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

As year 3 but with up to 4 digit numbers and with carrying.

Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.



Chd will be able to add any digit number with more than one carry if needed.

Th	H	T	O
2	3	1	4
+3	8	8	6
6	2	0	0
1	1	1	

Language

- add, addition, more, plus, increase
- sum, total, altogether
- score
- how many more to make...?
- one more, two more... ten more
- how many more to make...?
- how many more is... than...?
- how much more is...?

Steps to proficiency

- Addressing misconceptions.
 - Does the answer make sense? If I am adding, will the total be bigger or smaller?
 - Mistakes in setting out
 - Mistakes in carrying
 - Mixing methods
- Quick recall is vital. Counting one by one is not the most efficient method
- Number bonds to 10 and 20.
- Variation learning

Subtraction

Year 3 Column method without regrouping

Subtract numbers with up to three digits, using formal written methods of columnar subtraction.

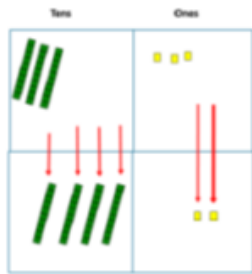
Add and subtract numbers mentally, including:

- i. a three-digit number and ones
- ii. a three-digit number and tens
- iii. a three-digit number and hundreds.

Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

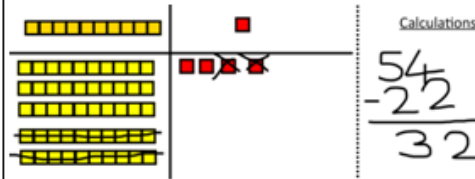
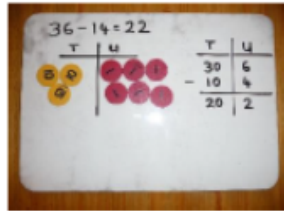
Estimate the answer to a calculation and use inverse operations to check answers.

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

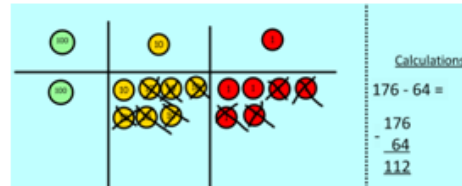


Use Base 10 to make the bigger number then take the smaller number away.

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.



Start with expanded method to subtract

$$47 - 24 = 23$$

$$\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$$

This will lead to a clear written column subtraction.

$$\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$$

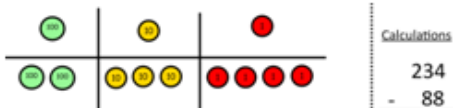
Year 4 Column method with regrouping

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

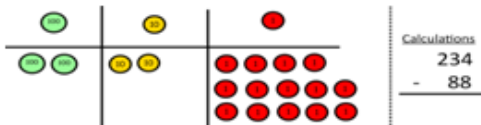
Estimate and use inverse operations to check answers to a calculation.

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

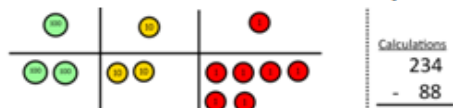
Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters.



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



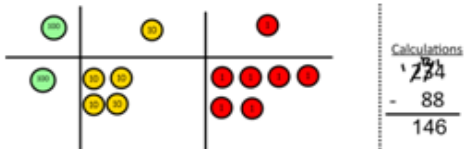
Now I can subtract my ones. Now look at the tens, can I take away 8 tens easily?



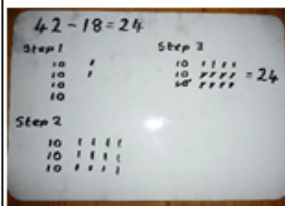
I need to exchange one hundred for ten tens.



Now I can take away eight tens and complete my subtraction



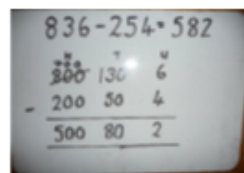
Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.



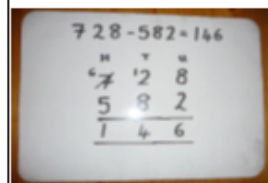
Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.

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.



Language

- subtract, subtraction, take (away), minus, decrease
- leave, how many are left/left over?
- difference between
- half, halve
- how many more/fewer is... than...?
- how much more/less is...?
- equals, sign, is the same as
- tens boundary, hundreds boundary

Steps to proficiency

- Addressing misconceptions.
 - Does the answer make sense? If I am subtracting, will the total be bigger or smaller?
 - Mistakes in borrowing
 - Mixing up with addition method
- Understanding difference

Multiplication

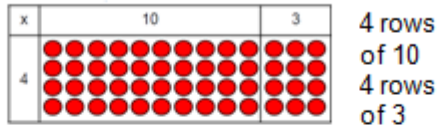
Year 3

Grid Method

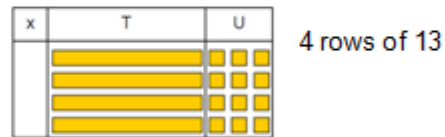
Children should always consider whether partitioning is the best strategy – if it is possible to use strategies such as doubling (some may use doubling twice for $\times 4$), they need to choose the most efficient strategy. Children may wish to make jottings, including a full grid as exemplified here – but grid method is not a formal method and its only purpose is to record mental calculations. This supports the development of the necessary mental calculating skills but does not hinder the introduction of formal written methods in Year 4. Concrete manipulatives are essential to develop understanding.

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. 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. 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.

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



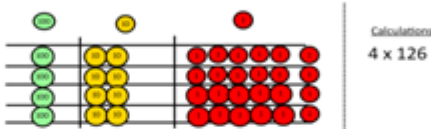
Move on to using Base 10 to move towards a more compact method.



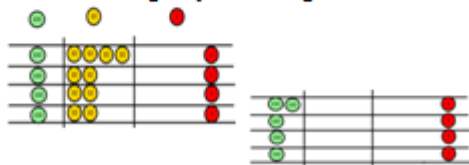
Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.



Fill each row with 126.



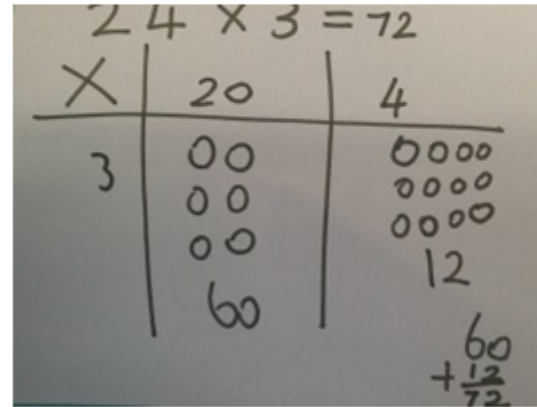
Add up each column, starting with the ones making any exchanges needed.



Then you have your answer.

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.

\times	30	5
7	210	35

$$210 + 35 = 245$$

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

	10	8
10	100	80
3	30	24

\times	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Year 4

Column multiplication

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.

Recall multiplication and division facts for multiplication tables up to 12×12 .

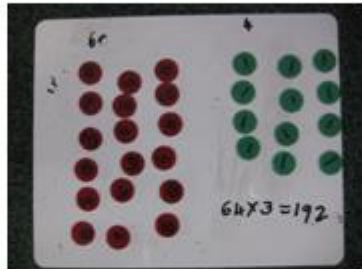
Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.

Recognise and use factor pairs and commutativity in mental calculations.

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.

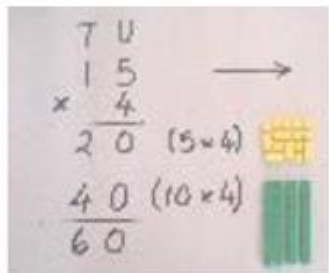
Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Children can continue to be supported by place value counters at the stage of multiplication.

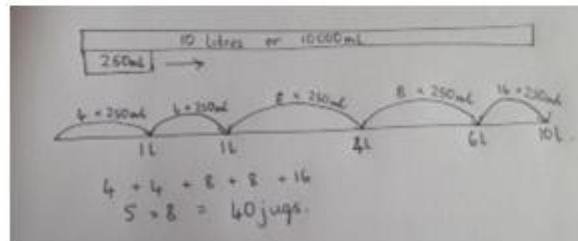
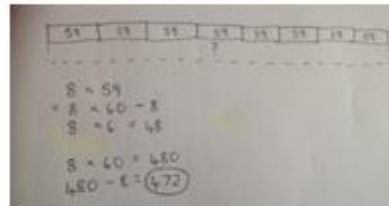


It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Use concrete apparatus to develop understanding of multiplication of 2 digits by 1 digit using the expanded method



Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



$$\begin{array}{r} \text{T} \quad \text{U} \\ 1 \quad 5 \\ \times \quad 4 \\ \hline 2 \quad 0 \quad (5 \times 4) \\ \underline{4 \quad 0} \quad (10 \times 4) \\ 6 \quad 0 \end{array}$$

Moving onto 3 digits by 1 digit

$$\begin{array}{r} 4 \quad 1 \quad 3 \times 5 \\ 3 \times 5 = 15 \\ 10 \times 5 = 50 \\ 400 \times 5 = + 2000 \\ \hline = 2065 \end{array}$$

Language

- lots of, groups of
- times, multiply, multiplication, multiplied by
- multiple of, product
- once, twice, three times... ten times...
- times as (big, long, wide... and so on)
- repeated addition
- array

Steps to proficiency

- Common misconceptions:
 - Not multiplying by power of ten in grid method
 - Adding incorrect values in grid method
- Understanding commutative law –
 - $2 \times 3 = 6$ is the same as $3 \times 2 = 6$
- Learning by rote
- Multiplication songs
- Missing number –
 - $2 \times ? = 6$
- Home school learning schemes
- Understanding of inverse

Division

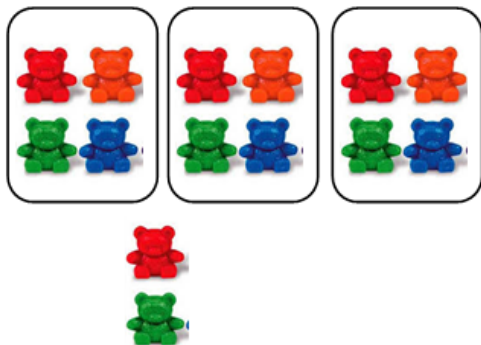
Year 3 Division with a remainder

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

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.

Solve problems, including missing number problems.

$14 \div 3 =$
Divide objects between groups and see how much is left over



Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



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



Complete written divisions and show the remainder using r.

$$29 \div 8 = 3 \text{ REMAINDER } 5$$

↑
↑
↑
↑

dividend
divisor
quotient
remainder

Year 4 Division through vertical method focussing on grouping

Recall multiplication and division facts for multiplication tables up to 12×12 .

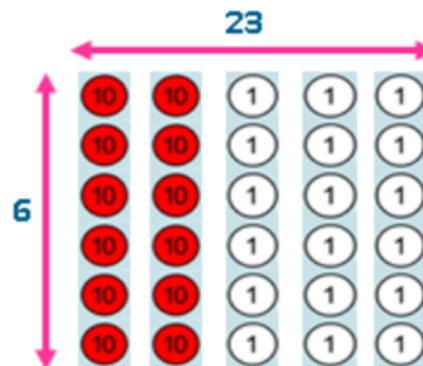
Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers.

Grouping and sharing using place value counters. Exchanging counters which cannot be grouped.

$$138 \div 6 = 23$$

Hundreds	Tens	Units
●	●●●	○○○○
	↓	↓
	●●●●	○○○○
	↓	↓
		○○○○
		↓
		○○○○

Result of grouping/sharing counters during 'concrete' stage.



Check using multiplication inverse.

Teach chd vertical method through grouping multiples of the divisor. Examples to include remainders.

$$\begin{array}{r}
 23 \text{ a)} \\
 7 \overline{) 161} \\
 \underline{-70} \quad (10 \times 7) \\
 91 \\
 \underline{-70} \quad (10 \times 7) \\
 21 \\
 \underline{-21} \quad (3 \times 7) \\
 0 \text{ d)}
 \end{array}$$

a) ↖
 b) ↑
 c) ↑
 d)

Link to work done on concrete and pictorial learning done previously

Language

- share, share equally
- one each, two each, three each...
- group in pairs, threes... tens
- equal groups of
- divide, division, divided by, divided into
- remainder

Steps to proficiency

- Knowledge of times table and corresponding division facts to aid efficiency
- Interpreting of remainder
- Understanding that groups must have equal amounts

- Understanding inverse to master concepts
- Parental input is vital