VALENCE PRIMARY SCHOOL-CALCULATION POLICY
2017/18
Year 4,Year 5 and Year 6

Aims- Based on the 2014 New Curriculum

To ensure that pupils

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

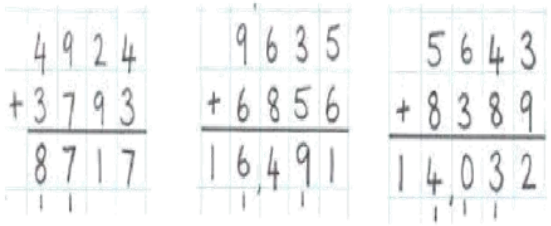
Addition

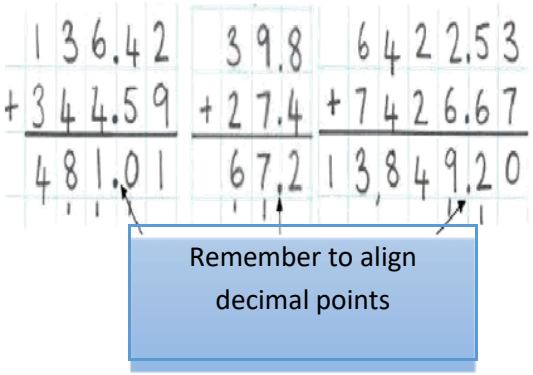
Year 4

Mental/Written Strategies

Count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

- **add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate**

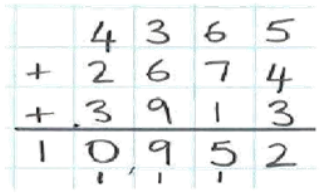




Year 5

Mental/Written Strategies

- Count regularly, on and back, now including steps of powers of 10.
- Children should extend the column method to adding more than two numbers including decimals.



They should be encouraged to choose from a range of strategies:

- Reordering: 5.7 + 5.6 – 0.7, 5.7 – 0.7 + 5.6 = 5 + 5.6
- Partitioning: counting on or back - 460 + 230, 460 + 200 + 30
- Partitioning: bridging through multiples of 10:
- Partitioning: compensating: 5.7 + 3.9, 5.7 + 4.0 – 0.1
- Partitioning: using 'near' double: 2.5 + 2.6 is double 2.5 and add 0.1 or double 2.6 and subtract 0.1
- Partitioning: bridging through 60 to calculate a time interval: It is 11.45. How many hours and minutes is it to 15.20?
- Using known facts and place value to find related facts.

Year 6

Mental/Written Strategies

- Consolidate previous years.
- Use efficient written methods
- Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45

Vocabulary

See previous years

Generalisations

Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as BODMAS, or could be encouraged to design their own ways of remembering. Sometimes, always or never true? Subtracting numbers makes them smaller.

Some Key Questions

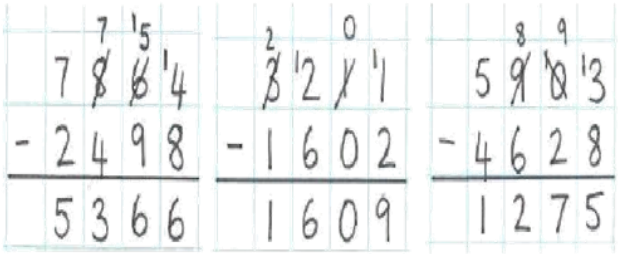
What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Subtraction

Year 4

Mental / Written Strategies

Subtract numbers with up to 4 digits using the formal written methods of column subtraction



They should be encouraged to choose from a range of strategies:

- Counting forwards and backwards: 124 – 47, count back 40 from 124, then 4 to 80, then 3 to 77
- Reordering: 28 + 75, 75 + 28 (thinking of 28 as 25 + 3)
- Partitioning: counting on or back: 5.6 + 3.7, 5.6 + 3 + 0.7 = 8.6 + 0.7
- Partitioning: bridging through multiples of 10: 6070 – 4987, 4987 + 13 + 1000 + 70
- Partitioning: compensating – 138 + 69, 138 + 70 - 1
- Partitioning: using 'near' doubles - 160 + 170 is double 150, then add 10, then add 20, or double 160 and add 10, or double 170 and subtract 10
- Partitioning: bridging through 60 to calculate a time interval – What was the time 33 minutes before 2.15pm?
- Using known facts and place value to find related

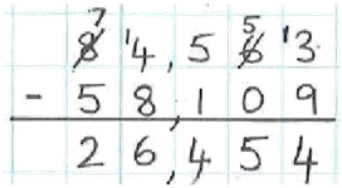
Year 5

Mental/ Written Strategies

Subtract whole numbers with more than 4 digits, including using formal written methods

Subtract numbers mentally with increasingly large numbers.

Subtract amounts of money.



They should be encouraged to choose from a range of strategies:

- Counting forwards and backwards in tenths and hundredths: 1.7 + 0.55
- Reordering: 4.7 + 5.6 – 0.7, 4.7 – 0.7 + 5.6 = 4 + 5.6
- Partitioning: counting on or back - 540 + 280, 540 + 200 + 80
- Partitioning: bridging through multiples of 10:
- Partitioning: compensating: 5.7 + 3.9, 5.7 + 4.0 – 0.1
- Partitioning: using 'near' double: 2.5 + 2.6 is double 2.5 and add 0.1 or double 2.6 and subtract 0.1

Year 6

Mental / Written Strategies

Consolidate previous years.

Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45

Vocabulary

See previous years

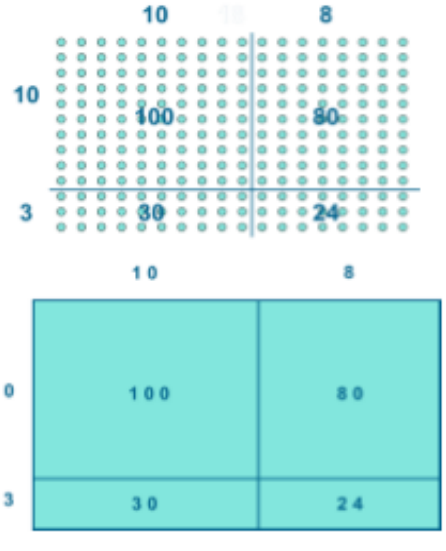
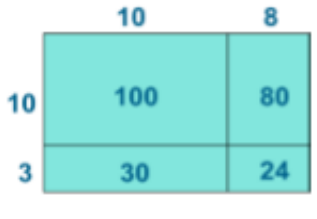
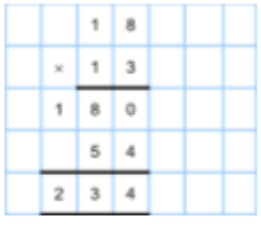
Generalisations

Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as PEMDAS, or could be encouraged to design their own ways of remembering. Sometimes, always or never true? Subtracting numbers makes them smaller.

Some Key Questions

What do you notice?
What's the same? What's different?
Can you convince me?
How do you know?

Multiplication

Year 4	Year 5	Year 6
Multiplication - Year 4	**Multiplication - Year 5**	**Multiplication - Year 6**
Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits □2 x 5 = 160 **Mental methods** Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100. Solving practical problems where children need to scale up. Relate to known number facts. (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?) **Written methods (progressing to 3d x 2d)** Children to embed and deepen their understanding of the grid method to multiply up 2d x 2d. Ensure this is still linked back to their understanding of arrays and place value counters. 	Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits **Mental methods** X by 10, 100, 1000 using moving digits ITP Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35) Recall of prime numbers up 19 and identify prime numbers up to 100 (with reasoning) Solving practical problems where children need to scale up. Relate to known number facts. Identify factor pairs for numbers **Written methods (progressing to 4d x 2d)** Long multiplication using place value counters Children to explore how the grid method supports an understanding of long multiplication (for 2d x 2d)  	Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits **Mental methods** Identifying common factors and multiples of given numbers Solving practical problems where children need to scale up. Relate to known number facts. **Written methods** Continue to refine and deepen understanding of written methods including fluency for using long multiplication | X	1000	300	40	2
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10	10000	3000	400	20
8	8000	2400	320	16	 2 3 1 1 3 4 2 x 1 8 1 3 4 2 0 1 0 7 3 6 2 4 1 5 6 1

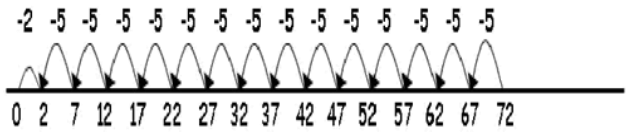
Division

Year 4

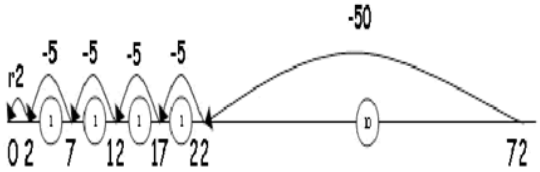
- Recall all related division facts for all tables.
- Divide whole numbers and those involving decimals up to 1dp by 10 and 100 and use this along with their times table knowledge to solve problems with decimals such as: 12x 0.3

- Develop their use of repeated subtraction to be able to subtract multiples of the divisor.

72 ÷ 5



Moving onto:



Year 5

- Continue to use written methods to solve short division TU ÷ U.
- 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.

Example

$$7\overline{)943} = 134\ r6$$

Chunking

167 ÷ 45

3 r 32

45 | 167

-135 **(45 x 3)**

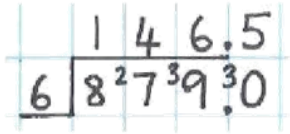
32

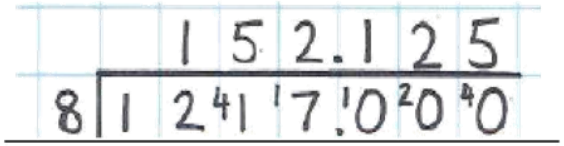
Answer 3 r 32

Year 6

- **Use efficient written methods of division:**

- **Short division – divide larger numbers and decimal numbers up to 2dp by a single digit, knowing how to give their answers as a decimal, remainder or fraction but providing a decimal answer. E.g**





Chunking – divide up to a 4 D.N by a 2 D.N

Use chunking to divide two and three digit numbers by one and two digit numbers.

73÷5 **How many 5's make 73?**

73
50 (10 x 5)

23
20 (4 x5)
3 - If the remainder is smaller than the divisor, stop

How many 5s have been subtracted? !4 set with 3 left over

Remainders should be shown as integers

Vocabulary

see years 1-3

divide, divided by, divisible by, divided into
share between, groups of

factor, factor pair, multiple
times as (big, long, wide …etc)

equals, remainder, quotient, divisor
inverse

Generalisations

The = sign means equality. Take it in turn to change one side of this equation, using multiplication and division, e.g.

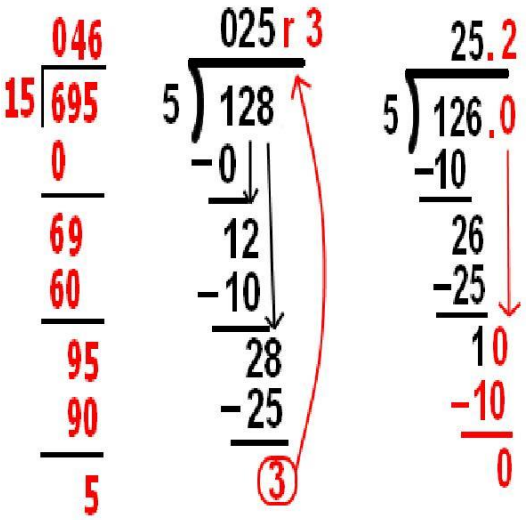
Start: **24 = 24**

Player 1: **4 x 6 = 24**

Player 2: **4 x 6 = 12 x 2**

Player 1: **48 ÷ 2 = 12 x 2**

Long Division



Generalisations

Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right).

Sometimes, always, never true questions about multiples and divisibility. E.g.: If a number is divisible by 3 and 4, it will also be divisible by 12.