Number at Fen Rivers

Progression pathway

In Year 1 we will…

Number and Place value:

- Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number

- Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens

- Given a number, identify one more and one less

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

- Read and write numbers from 1 to 20 in numerals and words

- Count within 100, forwards and backwards, starting with any number

- Reason about the location of numbers to 20 within the linear number system, including comparing using < > and =

Addition and subtraction

- Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs

- Represent and use number bonds and related subtraction facts within 20

- Add and subtract one-digit and two-digit numbers to 20, including zero

- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = [ ] − 9

- Develop fluency in addition and subtraction facts within 10

- Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts, including recognising odd and even numbers

- Read, write and interpret equations containing addition ($+$), subtraction ($-$) and equals ($=$) symbols, and relate additive expressions and equations to real-life contexts

Multiplication and division

- 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

- Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers

Fractions

- 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

In Year 2 we will...

Number and place value:

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward

- Recognise the place value of each digit in a two-digit number (tens, ones)

- Identify, represent and estimate numbers using different representations, including the number line

- Compare and order numbers from 0 up to 100; use <, > and = signs

- Read and write numbers to at least 100 in numerals and in words

- Use place value and number facts to solve problems

- Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and non-standard partitioning

- Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10

Number – Addition and subtraction:

- Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures

- Solve problems with addition and subtraction: applying their increasing knowledge of mental and written methods

- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

- Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones

- Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and tens

- Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: two two-digit numbers

- Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: adding three one-digit numbers

- 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
- Secure fluency in addition and subtraction facts within 10, through continued practice
- Add and subtract across 10
- Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more…?"
- Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number
- Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2-digit numbers

Multiplication and division:

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts
- Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables
- Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotative division)

Fractions:

- Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity
- Write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and ½

In Year 3 we will...

Number and place value:

- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)

- Compare and order numbers up to 1000

- Identify, represent and estimate numbers using different representations

- Read and write numbers up to 1000 in numerals and in words

- Solve number problems and practical problems involving these ideas

- Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three-digit multiples of 10

- Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning

- Reason about the location of any three-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10

- Divide 100 into 2, 4, 5, and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts

- Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10)

Addition and subtraction:

- Add and subtract numbers mentally, including: a three-digit number and ones

- Add and subtract numbers mentally, including: a three-digit number and tens

- Add and subtract numbers mentally, including: 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

- Secure fluency in addition and subtraction facts that bridge 10, through continued practice

- Calculate complements to 100

- Add and subtract up to three-digit numbers using columnar methods*

- Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part-part-whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction

Multiplication and division:

- 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

- Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number

- Apply known multiplication and division facts to solve contextual problems with different structures, including quotative and partitive division

Fractions

- 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

- Recognise and show, using diagrams, equivalent fractions with small denominators

- Add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7]

- Compare and order unit fractions, and fractions with the same denominators

- Solve problems that involve all of the above

- Interpret and write proper fractions to represent 1 or several parts of a whole that is divided into equal parts

- Find unit fractions of quantities using known division facts (multiplication fluency)

- Reason about the location of any fraction within 1 in the linear number system

- Add and subtract fractions with the same denominator, within 1

In Year 4 we will...

Number and place value

- Count in multiples of 6, 7, 9, 25 and 1000

- Find 1000 more or less than a given number

- Count backwards through zero to include negative numbers
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones)
- Order and compare numbers beyond 1000
- Identify, represent and estimate numbers using different representations
- 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
- Read Roman numerals to 100 (I to C) and know that over time, the number system changed to include the concept of zero and place value
- Know that 10 hundreds are equivalent to 1 thousand, and that 1000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit numbers of 100
- Reason about the location of any four-digit number in the linear number system, including identifying the previous and next multiple of 1000 and 100, and rounding to the nearest of each
- Divide 1000 into 2, 4, 5, 10 equal parts, and read scales/number lines marked with multiples of 1000 and 2, 4, 5, 10 equal parts
- Apply place value knowledge to known additive and multiplicative number facts (scaling facts by 100)

Addition and subtraction

- 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

Multiplication and division

- Recall multiplication and division facts for multiplication tables up to 12 x 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 number by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m terms

- Recall multiplication and division facts up to 12 x 12 and recognise products in multiplication tables as multiples of the corresponding number

- Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders approximately according to the context

- Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size

- Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication

- Understand and apply the distributive property of multiplication

Fractions

- Recognise and show, using diagrams, families of common equivalent fractions

- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten

- 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

- Add and subtract fractions with the same denominator

- Recognise and write decimal equivalents of any number of tenths or hundredths

- Recognise and write decimal equivalents to ¼, ½, ¾

- 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

- 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

- Solve simple measure and money problems involving fractions and decimals to two decimal places

- Reason about the location of mixed numbers un the linear number system

- Convert mixed numbers to improper fractions and vice versa

- Add and subtract improper and mixed fractions with the same denominator, including bridging whole numbers

In Year 5 we will...

Number and place value

- Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit

- Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000

- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- 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
- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals
- Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01
- Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning
- Reason about the location of any number with up to 2 decimal places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each
- Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts
- Convert between unites of measure, including using common decimals and fractions

Addition and subtraction

- 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
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Multiplication and division

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 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
- 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 1,000

- Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})

- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes

- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign

- Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

- Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size

- Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors

- Multiply any whole numbers with up to 4 digits by any one-digit number using a formal written method*

- Divide a number with up to 4 digits by a one-digit number using formal written method*, and interpret remainders approximately for the context

Fractions

- Compare and order fractions whose denominators are all multiples of the same number

- 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, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]

- 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

- 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

- Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place

- Read, write, order and compare numbers with up to 3 decimal places

- Solve problems involving number up to 3 decimal places

- Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction

- 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

- Find a non-unit fractions of quantities

- Find equivalent fractions and understand that they have the same value and the same position in the linear number system

- Recall decimal fraction equivalents for ½ , ¼ , 1/5 and 1/10 and for multiples of these proper fractions

In Year 6 we will...

Number and place value

- Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit

- Round any whole number to a required degree of accuracy

- Use negative numbers in context, and calculate intervals across 0

- Solve number and practical problems that involve all of the above

- Understand the relationship between powers of 10 from 1 hundredth to 10 million and use this to make a given number 10, 100, 1000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1000)

- Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and non-standard partitioning

- Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system and round numbers, as appropriate, including in contexts

- Divide powers of 10, from 1 hundredth to 10 million, into 2,4,5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2,4,5 and 10 equal parts

Addition, subtraction, multiplication and division

- 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

- Identify common factors, common multiples and prime numbers

- Use their knowledge of the order of operations to carry out calculations involving the 4 operations
- 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
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
- Understand that 2 numbers can be related additively or multiplicatively and quantify additive and multiplicative relationships (multiplicative relationships restricted to multiplication by a whole number)
- Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding
- Solve problems involving ratio relationships
- Solve problems with 2 unknowns

Fractions

- Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- Compare and order fractions, including fractions >1
- 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, $\frac{1}{3} \div 2 = \frac{1}{6}$]
- Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- Identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places
- Multiply one-digit numbers with up to 2 decimal places by whole numbers
- Use written division methods in cases where the answer has up to 2 decimal places
- Solve problems which require answers to be rounded to specified degrees of accuracy
- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts
- Recognise when fractions can be simplified, and use common factors to simplify fractions

- Express fractions in a common denomination and use this to compare fractions that are similar in value
- Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denomination as a comparison strategy

In KS3 we will...

- Understand and use place value for decimals, measures and integers of any size
- Order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers
- Use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property
- Use the four operations, including formal written methods*, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative
- Use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals
- Recognise and use relationships between operations including inverse operations
- Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations
- Interpret and compare numbers in standard form $A \times 10^n$ $1 \le A < 10$, where n is a positive or negative integer or zero
- Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $^7/_2$ or 0.375 and $^3/_8$)
- Define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages and work with percentages greater than 100%
- Interpret fractions and percentages as operators
- Use standard units of mass, length, time, money and other measures, including with decimal quantities
- Round numbers and measures to an appropriate degree of accuracy (for example, to a number of decimal places or significant figures)
- Use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation $a < x \le b$

- Use a calculator and other technologies to calculate results accurately and then interpret them appropriately
- Appreciate the infinite nature of the sets of integers, real and rational numbers