AVON HOUSE
PREPARATORY SCHOOL

CELEBRATING & SUPPORTING EVERY CHILD

STEM Guidance Handbook

Contents:

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CELEBRATING & SUPPORTING EVERY CHILD

STEM Guidance

(Whole school including EYFS)

Rationale

The teaching of STEM subjects at Avon House School aims to provide opportunities for all pupils to engage in problem solving and practical activities to develop their critical thinking, group work and technological abilities.

STEM involves the teaching of Science, Technology, Engineering and Mathematics as an interdisciplinary approach. Therefore, STEM sessions will incorporate two or more of the four subject elements to be considered that STEM learning has taken place. The majority of STEM learning will take place in Science lessons, where pupils will complete at least one STEM Project per term.

Where possible, children should be posed with real-world problems. Sessions should also be child-led, with the teacher taking on the role as the facilitator, prompting and guiding pupils where necessary.

Aims

STEM teaching aims to:

- Improve pupils' problem solving and critical thinking skills;
- Encourage pupils to develop a passion for science, technology, engineering and mathematics at the EYFS and Primary Stage, and beyond;
- Inspire all pupils to pursue STEM subjects, no matter their race, religion or gender, in line with the rights given to them under the UNCRC;
- Offer opportunities for pupils to engage in practical and creative activities which develop their skills as designers, developers, inventors and engineers;
- Develop pupils' mathematical abilities outside of their mathematics lessons;
- Help pupils to foster growth mindsets and realise that mistakes are part of the learning process;
- Inform pupils of the various career opportunities that exist within the STEM sector.

Teaching and Learning

STEM teaching will be implemented in a number of different ways across the school.

At the Foundation Stage

Practical tasks and activities are used to support the teaching and learning of STEM skills. Children learn to make sense of science, technology, engineering and mathematics through stories, songs and rhymes, games, sand and water, construction on a large and small scale, imaginative play, outdoor play, role play, cooking and shopping, 2 and 3-D creative

work with a range of materials, observing numbers and patterns in the environment, and in daily routines. Children also use computers, cameras, the Interactive White Board and Learn Pads to enhance their technological abilities.

Key Stage One
Key Stage One pupils will have five Mathematics sessions per week, two Science lessons, and one Computing lesson, where they will broadly follow the National Curriculum programmes of study for each year group. In addition to this, pupils will have one Problem Solving and Construction lesson per week, where they will be guided to problem solve and complete practical construction tasks based around a given problem.

Key Stage Two
Key Stage Two pupils will have five Mathematics sessions per week, one double Science lesson, and one Computing lesson, where they will broadly follow the National Curriculum programmes of study for each year group. In addition to this, Year 3 and 4 pupils will have one Critical Thinking lesson per week, where they will solve STEM problems, as well as complete tasks relating to Philosophy for Children, online safety and debate.

Marking

Feedback is given to the pupils as soon as possible, and marking work will be guided by the school's Marking Guidance. This aims to encourage and to give guidance for future work. Some marking will be immediate, depending on the activity and oral feedback is given to enhance understanding. Children are encouraged to show their working out and to check for errors.

Record Keeping and Evidencing Pupil Work

Problem Solving and Construction work will be evidenced in a class Scrap Book, which will include photographic evidence as well as occasional short written responses from the children. At certain points in the year, STEM displays will reflect the work from these sessions.

Year 3 and 4 pupils will have an A5 Critical Thinking notebook in which they will make notes, complete sketches and summarise learning from their sessions. Work may also be evidenced through photographs placed in a class Scrap Book. At certain points in the year, STEM displays will reflect the work from these sessions.

Inclusion

In school we aim to meet the needs of all our pupils by differentiation in our planning and in providing a variety of approaches and tasks appropriate to ability levels. This will enable pupils with learning and/or physical difficulties to take an active part in STEM learning and practical activities and investigations and to achieve the goals they have been set. Some pupils will require closer supervision and more adult support to allow them to progress whilst more able pupils will be extended through differentiated activities. Where

appropriate, pupils will be encouraged to work in mixed ability groups for select tasks. By being given enhancing and enriching activities, more able pupils will be able to progress to a higher level of knowledge and understanding appropriate to their abilities.

Health and Safety

With regard to science work in school, appropriate reminders will be given to pupils about potential hazards, hygiene and care of the equipment they are using. In addition, relevant PPE will be explained and used.

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Mathematics Guidance

(Whole School including EYFS)

Rationale

The teaching of mathematics at Avon House School aims to develop the pupils' understanding of mathematics through problem solving and practical activities. These will be supported by a variety of materials and prepare the pupils for its applied use in the real world. Mathematics is a tool for life and we look to ensure that our pupils acquire high standards in this subject.

The curriculum aims to give the pupils a coherent, progressive and challenging experience within relevant contexts which will be suitable for their ages, abilities and will be differentiated to meet the needs of all pupils. The pupils will be given the opportunity to develop their knowledge and understanding of mathematics through a variety of approaches. This will give them an awareness of the relevance and purpose of mathematics in their lives.

Pupils will become fluent in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. They will reason mathematically by following a line of enquiry and justify their results using mathematical language. The use of associated materials and resources such as I.C.T. and mathematical games will also make a contribution to their learning.

Aims

- To encourage an interest in mathematics and the manipulation of numbers
- To inspire the pupils to take responsibility for their own learning
- To ensure that the pupils acquire a structured, progressive understanding of the concepts and skills in the Mathematical schemes which they are being taught
- To give the pupils practical experiences in the different aspects of the Mathematical curriculum
- To identify pupils who are experiencing difficulty or who have a particular aptitude in Mathematics and ensure that they have the necessary support to assist or extend whenever possible
- To ensure that the Mathematics curriculum is relevant to the pupils' needs and environment in the modern technological society in which they are participants
- To deliver best practice lessons in a dynamic and challenging way
- To offer the pupils the opportunities to use mathematical language and develop concepts through investigations and problem solving

Implementation

Mathematics is a National Curriculum core subject. In the National Curriculum 2014 programmes of study the subject is divided into sub categories to illustrate progression in key areas.

- Number – Number and Place Value

- Number – Addition and Subtraction
- Number – Multiplication and Division
- Number- Fractions (including decimals and percentages)
- Measurement
- Geometry – properties of shapes
- Geometry – position and direction
- Statistics
- Algebra (Year 6)
- Ratio and Proportion (Year 6)

Teaching and Learning

The use and application of mathematical principles underpins the whole of mathematical teaching and learning. Opportunities are given for pupils to apply their knowledge to a wide range of real life situations. They need to be able to choose appropriate equipment and methods for the task and to communicate and justify their findings in a manner commensurate to their age and ability, showing increasing concern for clarity and accuracy of meaning. The teaching staff adhere to the calculation policy which is designed to give pupils a consistent and smooth progression of learning calculations across the school.

The pupils will record their work in appropriate ways for a variety of purposes, with a high emphasis on the quality of presentation.

At the Foundation Stage

Practical tasks and activities are used to support the teaching and learning of number calculation. Children learn to make sense of mathematics through stories, songs and rhymes, finger games, board games, sand and water, construction on a large and small scale, imaginative play, outdoor play, role play, cooking and shopping, 2 and 3-D creative work with a range of materials observing numbers and patterns in the environment and in daily routines.

Key Stages One and Two:

Mathematics lessons broadly follow the National Curriculum programmes of study for each year group. In Years 1 and 2, the Abacus framework and textbooks are used. The Collins 'Busy Ant Maths' scheme is used in the Prep school alongside the ISEB maths textbooks. Teaching is interactive, supported by practical equipment when appropriate and may also involve whole class and group discussions, practical activities and problem-solving tasks.

The teacher will give demonstrations and explanations, with an emphasis on the use of appropriate mathematical language. Children will practise, consolidate and build on core skills. Teaching Assistants will support individual learners and small groups. Teachers encourage children to develop their ability to reason mathematically by taking part in investigations and problem solving.

Mental calculation is a key feature, with pupils being taught a range of strategies to work out answers as well as learning the quick recall of simple mathematical facts. Children will take weekly mental maths or arithmetic tests where key facts and skills will be

reviewed. A weekly times tables test will also take place and is differentiated depending on the children's knowledge of multiplication facts.

Mathematical work will be displayed to reinforce mathematical concepts, assist in learning, and celebrate achievement.

The Mathematics framework is supported with online learning through Mathletics and Education City.

Inclusion

In school we aim to meet the needs of all our pupils by differentiation in our planning and in providing a variety of approaches and tasks appropriate to ability levels. Pupils with SEN are taught within the daily mathematics lesson and are encouraged to participate fully. Individual children and small groups are included in intervention groups led by the SENCO. Where applicable pupils' IOPs incorporate suitable objectives from the progression maps and teachers keep these objectives in mind when planning work. Within the daily mathematics lesson, teachers not only provide activities to support pupils who find mathematics difficult but also activities that provide appropriate challenges for pupils who are high achievers in this subject.

Assessment

Assessment is an integral part of the teaching process. Assessment is used to inform planning and to facilitate differentiation. The assessment of pupils' work is on-going to ensure that understanding is being achieved and that progress is being made. Progression maps are used to guide teachers on age related expectations for each of the subject areas.

Our assessment policy sets out the strategies we use to ensure continuity and progression in the teaching of mathematics. Termly assessments are used to gauge progress towards these targets, and to identify any underachieving pupils. Each teacher uses Classroom Monitor to input data on progress for each of the maths strands.

Marking

Marking Feedback is given to the pupils as soon as possible, and marking work will be guided by the school's Marking Policy. This aims to encourage and to give guidance for future work. Some marking will be immediate, depending on the activity and oral feedback is given to enhance understanding. Children are encouraged to show their working out and to check for errors.

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Mathletics

Each child from Foundation 2 to Year 6 is provided with a Mathletics and Education City subscription upon joining the school. Children can access their portals at home to review learning and complete homework set by the class teachers.

In weekly assemblies the child with the highest usage is awarded a certificate and the top class usage is also recognised. Mathletics homework is set regularly and teachers review scores to highlight misconceptions and monitor progress.

Resources from the 'Mathletics Library' can also be used by teaching staff to supplement learning, whether as homework tasks, or within lessons.

Homework

We recognise the importance of making links between home and school and encourage parental involvement with the learning of mathematics (see Homework Guidance). Maths homework is set regularly and involves written and online tasks.

Homework provides opportunities for pupils: to practise and consolidate their skills and knowledge; to develop and extend their techniques and strategies; to share their mathematical work with their family; and to prepare for their future learning.

Health and Safety

With regard to maths work in school, appropriate reminders will be given to pupils about potential hazards, hygiene and care of the equipment they are using. In addition, relevant PPE will be explained and used.

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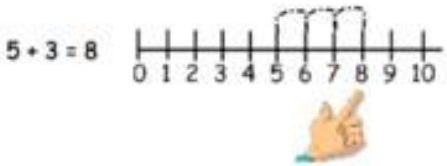
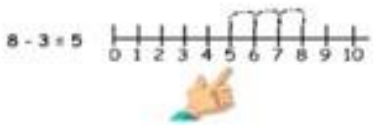
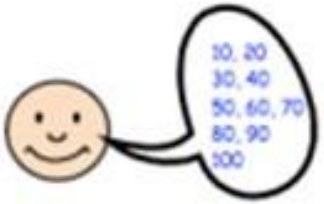
Calculation Guidance

The following calculation guidance has been devised to meet the requirements of the National Curriculum 2014 for the teaching and learning of Mathematics, and is also designed to give pupils a consistent and smooth progression of learning calculations across the school. The early number skills in learning and calculation in Foundation 1 and Foundation 2 follows the EYFS Curriculum.

The calculation guidance is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught to the stage that they are currently working at**, progressing onto the next stage as soon as they are ready, or working at a lower stage until they are secure enough in the level to move on.

It is important that any type of calculation is given a real-life context or problem-solving approach to help build children's understanding of the purpose of calculation, and to help them to recognise when to use each operation and methods when faced with problems. This must be a priority within maths lessons.

Children need to be taught and encouraged to use the most appropriate method; whether it be a mental strategy, using jottings or an efficient written method to be able to solve a calculation depending on its difficulty.

Calculation Guidelines for Foundation Stage			
ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION
Children begin to record in the context of play or practical activities and problems.			
Begin to relate addition to combining two groups of objects, matching numeral and quantity. • Make a record in pictures, words or symbols of addition activities already carried out. • Construct number sentences to go with practical activities • Use of games, songs and practical activities to begin using vocabulary Solve simple word problems using their fingers and resources  5 + 1 = 6 Can find one more to ten. The children will progress to using a number line. They jump forwards along the number line using their finger.  	Begin to relate subtraction to 'taking away' • Make a record in pictures, words or symbols of subtraction activities already carried out • Use of games, songs and practical activities to begin using vocabulary • Construct number sentences to go with practical activities • Relate subtraction to taking away and counting how many objects are left.  5 - 1 = 4 Can find one less to ten. The children will progress to counting backwards along a number line using finger.  	Real life contexts and use of practical equipment to count in repeated groups of the same size: • Count in twos; fives; tens Also chanting in 2s, 5s and 10s.  	Share objects into equal groups Use related vocabulary Activities might include: • Sorting activities with people/compare bears • Separate a given number of objects into two groups (addition and subtraction objective in reception being preliminary to multiplication and division) • Discussion relating to sharing objects/toys between groups of children • Splitting shapes into two halves

ADDITION GUIDELINES

Year One

+ = signs and missing numbers

Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

2 = 1+ 1
2 + 3 = 4 + 1
3 = 3
2 + 2 + 2 = 4 + 2

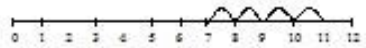
Missing numbers need to be placed in all possible places to enable the children to find and understand the relationship between number facts

3 + 4 = □	□ = 3 + 4
3 + □ = 7	7 = □ + 4
□ + 4 = 7	7 = 3 + □
□ + ▽ = 7	7 = □ + ▽

The Number Line

Children use a numbered line to count on in ones. Children use number lines and practical resources to support calculation and teachers *demonstrate* the use of the number line.

7+ 4



Children to add one and two digit numbers up to 20. They will memorise and reason with number bonds up to 10 and 20 and understand the effect of adding 0.

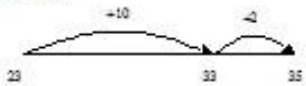
The children will progress to adding mentally by putting the larger number in their head and counting on with their fingers. They will begin to partition two digit numbers into tens and units e.g. 23= 20 + 3.

Year Two

+ = signs and missing numbers
Continue using a range of equations as in Year 1 but with appropriate, larger numbers.
Extend to
14 + 5 = 10 + □ and
32 + □ +□ = 100 35 = 1 + □ + 5

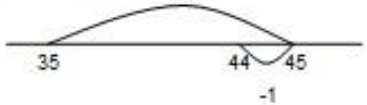
Partition into tens and ones and recombine
12 + 23 = 10 + 2 + 20 + 3
= 30 + 5
= 35

Count on in tens and ones
23 + 12 = 23 + 10 + 2
= 33 + 2
= 35



Partitioning and bridging through 10.
The steps in addition often bridge through a multiple of 10 e.g.
Children should be able to partition the 7 to relate adding the 2 and then the 5.
8 + 7 = 15

Add 9 or 11 by adding 10 and adjusting by 1
e.g.
Add 9 by adding 10 and adjusting by 1
35 + 9 = 44



Written Method
Children will begin to add a two digit to a one digit number, then a two digit to two digit number using expanded column addition in the summer term.

Method 1

36 + 41 =
30 + 6
40 + 1
70 + 7 = 77

Method 2

36 + 45 = 36
+ 45
11
70
81

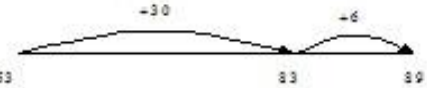
Year Three

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

Partition into tens and ones

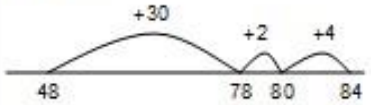
- Partition both numbers and recombine.
- Count on by partitioning the second number only e.g.

36 + 53 = 53 + 30 + 6
= 83 + 6
= 89



Add a near multiple of 10 to a two-digit number
Secure mental methods by using a number line to model the method. Continue as in Year 2 but with appropriate numbers
e.g. 35 + 19 is the same as 35 + 20 – 1.

Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.
48 + 36 = 84



Written Method
83 + 42 = 125
Children will use the formal column method to add numbers with up to three digits. When carrying a tens digit they will place the digit underneath the calculation. Revert to expanded methods if the children experience any difficulty.

1. Column Addition

83	729
+ 42	+ 58
125	787
	1

ADDITION GUIDELINES		
Year Four	Year Five	Year Six
+ = signs and missing numbers Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Add the nearest multiple of 10, then adjust** **Continue as in Year 2 and 3 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 - 1** **Written Method** Children to continue to use formal column method for addition with numbers containing up to four digits. 1367 + 2185 = 3552 1367 +2185 3552 1 1 Revert to expanded methods if the children experience any difficulty.	**+ = signs and missing numbers** Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Add or subtract the nearest multiple of 10 or 100, then adjust** Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. 458 + 79 = is the same as 458 + 80 - 1 **Written Method** Extend to numbers with at least five digits 43587 + 675 = 44262 43587 + 675 44262 1 1 1 Revert to expanded methods if the children experience any difficulty. Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits). 72.8 +54.6 127.4 1 1	**+ = signs and missing numbers** Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Add the nearest multiple of 10, 100 or 1000, then adjust** Continue as in Year 2, 3, 4 and 5 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc **Written Method** Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places. 13.86 + 9.481 = 23.341 13.86 + 9.481 23.341 1 1 1 Revert to expanded methods if the children experience any difficulty.

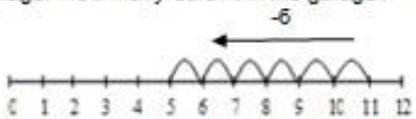
SUBTRACTION GUIDELINES

Year One

- Understand subtraction as 'take away'

- Use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number.

I have 11 toy cars. There are 6 cars too many to fit in the garage. How many cars fit in the garage?



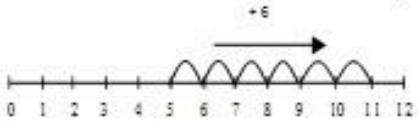
Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences
Recording by
- drawing jumps on prepared number lines
- constructing own number lines

- = signs and missing numbers

7 - 3 = □	□ = 7 - 3
7 - □ = 4	4 = □ - 3
□ - 3 = 4	4 = 7 - □
□ - ▽ = 4	4 = □ - ▽

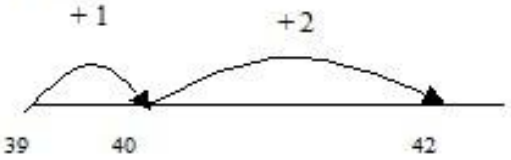
- Find a 'difference' by counting up;

I have saved 5p. The socks that I want to buy cost 11p. How much more do I need in order to buy the socks?

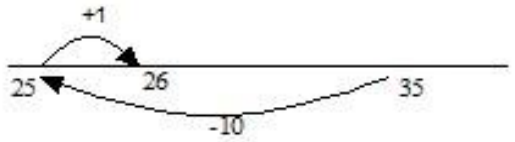


Year Two

- = signs and missing numbers
Continue using a range of equations as in Year 1 but with appropriate numbers.
Extend to 14 + 5 = 20 - □
Find a small difference by counting up
42 – 39 = 3

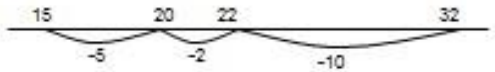


Subtract 9 or 11. Begin to add/subtract 19 or 21
35 – 9 = 26



Use known number facts and place value to subtract
(partition second number only)
37 – 12 = 37 – 10 – 2
= 27 – 2
= 25

Bridge through 10 where necessary
32 - 17



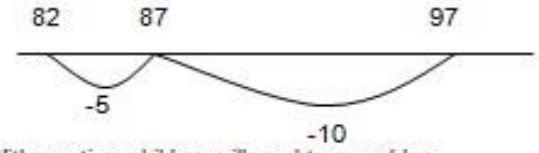
Written Methods
In the summer term, the children will use the simple written column method to subtract without borrowing.

Year Three

- = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.
Find a small difference by counting up
Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

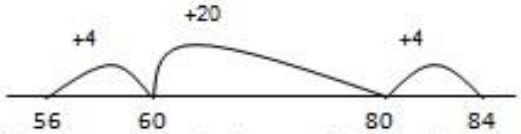
Subtract mentally a 'near multiple of 10' to or from a two-digit number
Continue as in Year 2 but with appropriate numbers e.g. 78 – 49 is the same as 78 – 50 + 1

Use known number facts and place value to subtract
Continue as in Year 2 but with appropriate numbers
e.g. **97 – 15 = 82**



With practice, children will need to record less information and decide whether to count back or forward. It is useful to ask children whether counting up or back is the more efficient for calculations such as 57 – 12, 86 – 77 or 43 – 28.

Written Methods
Complementary addition
84 – 56 = 28



Children to use formal column method for subtraction with numbers with up to three digits.

786 – 54 = 732

$$\begin{array}{r} 786 \\ -\ 54 \\ \hline 732 \end{array}$$

SUBTRACTION GUIDELINES

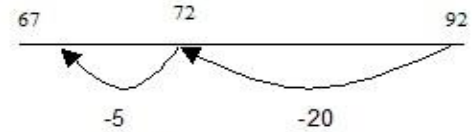
(- = signs and missing numbers: Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.)

Year Four

Find a small difference by counting up
e.g. 5003 – 4996 = 7
This can be modelled on an empty number line (see complementary addition below). Children should be encouraged to use known number facts to reduce the number of steps.

Subtract the nearest multiple of 10, then adjust.
Continue as in Year 2 and 3 but with appropriate numbers.

Use known number facts and place value to subtract
92 – 25 = 67



Written Method

Children to subtract numbers with up to four digits using the formal column method for subtraction.

874 – 523 becomes

8	7	4
– 5	2	3
3	5	1

Answer: 351

932 – 457 becomes

8	12	1
9	3	2
– 4	5	7
4	7	5

Answer: 475

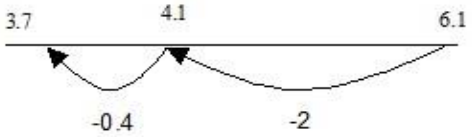
They will use exchanging strategy and make adjustments to the calculation at the top of the sum.

Year Five

Find a difference by counting up
e.g. 8006 – 2993 = 5013
This can be modelled on an empty number line (see complementary addition below).

Subtract the nearest multiple of 10 or 100, then adjust.
Continue as in Year 2, 3 and 4 but with appropriate numbers.

Use known number facts and place value to subtract
6.1 – 2.4 = 3.7



Written Method

Children to subtract numbers with more than four digits using the formal column method for subtraction. They will subtract decimals with mixed places.

Year Six

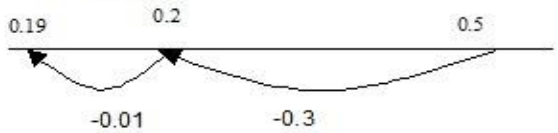
Find a difference by counting up
e.g. 8000 – 2785 = 5215
To make this method more efficient, the number of steps should be reduced to a minimum through children knowing:

- Complements to 1, involving decimals to two decimal places (0.16 + 0.84)
- Complements to 10, 100 and 100

Subtract the nearest multiple of 10, 100 or 1000, then adjust
Continue as in Year 2, 3, 4 and 5 but with appropriate numbers.

Use known number facts and place value to subtract

0.5 – 0.31 = 0.19



Written Method

Children to subtract numbers with increasingly large and more complex numbers and decimal values using the formal column method for subtraction.

MULTIPLICATION GUIDELINES

Year One

Arrays and repeated addition

Multiplication is related to repeated addition and counting groups of the same size.

Looking at columns
2 + 2 + 2
3 groups of 2

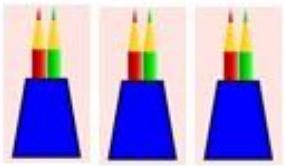
Looking at rows
3 + 3
2 groups of 3

Counting using a variety of practical resources

Counting in 2s e.g. counting socks, shoes, animal's legs…
Counting in 5s e.g. counting fingers, fingers in gloves, toes…
Counting in 10s e.g. fingers, toes…

Pictures / marks

The children are encouraged to draw pictures to aid their understanding.
e.g. There are 2 pencils in each pot.
How many pencils are there in 3 pots?



3 x 2 = 6

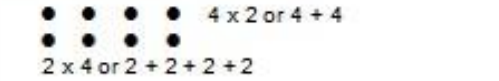
The children are taught to count in multiples using their fingers e.g. 4 x 10 = 10,20,30,40

Year Two

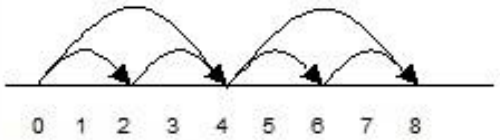
x = signs and missing numbers

7 x 2 = □	□ = 2 x 7
7 x □ = 14	14 = □ x 7
□ x 2 = 14	14 = 2 x □
□ x ∇ = 14	14 = □ x ∇

Arrays and repeated addition



4 x 2 or 4 + 4
2 x 4 or 2 + 2 + 2 + 2

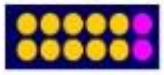


Doubling multiples of 5 up to 50

15 x 2 = 30

Partition

Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: 6 = 5 + 1 so e.g. Double 6 is the same as double five add double one.



AND double 15

10 + 5
↓ ↓
20 + 10 = 30

OR

X	10	5	
2	20	10	= 30

Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other.

Year Three

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers.

Arrays and repeated addition

Continue to understand multiplication as repeated addition and continue to use arrays where necessary.

Doubling multiples of 5 up to 50

35 x 2 = 70

Partition

X	30	5	
2	60	10	=70

Use known facts and place value to carry out simple multiplications.
Children to recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Written Methods

Children will use the short multiplication method for multiplying a 2 digit number by a 1 digit number. They will carry the tens digit underneath the calculation.

```
  22          58
 x 3         x 4
 66         212
             1
```

MULTIPLICATION GUIDELINES

Year Four

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers

Partition

Continue to use arrays:

18 x 9 = 162

18 x 9 = (10 x 9) + (8 x 9) = 162

Children to recall multiplication and division facts for multiplication tables up to 12 × 12

Written Methods

Column method:
multiplying 2 and 3 digit numbers by a 1 digit number. Children to carry tens digits underneath the calculation.

```
  275
x   6
1650
 4 3
```

Children should describe what they do by referring to the actual values of the digits in the columns. For example, the first step in 38 × 7 is 'thirty multiplied by seven', not 'three times seven', although the relationship 3 × 7 should be stressed.

```
  38
x 7
266
 5
```

Year Five

Partition

47 x 6 = 282

47 x 6 = (40 x 6) + (7 x 6) = 282

Children to recall multiplication and division facts for multiplication tables up to 12 × 12 and use them to derive related facts.

Written Methods

Column Method

Children to multiply numbers with up to 4 digits by a one- or two-digit number.

```
 2741
x   6
16446
 4 2
```

Children to use long multiplication method to multiply a 2 digit number by a 2 digit number.

```
   64
x  39
  576
  5 3
+1920
  1 1
 2496
```

Children to work through calculation, firstly multiplying 64 x 9 and then multiplying 64 x 30 before adding the totals together. Children will learn to add 0 to second line of sum before multiplying by the tens digit to ensure they have multiplied the answer by the correct amount.

Year Six

Partition

87 x 6 = 522

87 x 6 = (80 x 6) + (7 x 6) = 522

Children to recall multiplication and division facts for multiplication tables up to 12 × 12 and use them to derive related facts.

Written Methods

Children will continue to use column method and long multiplication method.
Children who are already secure with multiplication for TU × U and TU × TU should have little difficulty in using the same method for HTU × TU or applying decimals.

```
  286
x 29
2574   (9 x 286 = 2574)
5720   (20 x 286 = 5720)
8294
1
```

DIVISION GUIDELINES

Year One

Sharing
Requires secure counting skills

Sharing – 6 sweets are shared between 2 people. How many do they have each?

Practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.

Grouping
Sorting objects into 2s / 3s/ 4s etc
How many pairs of socks are there?

There are 12 tulip bulbs. Plant 3 in each pot. How many pots are there?
Jo has 12 Lego wheels. How many cars can she make?

The children will begin to write simple division number sentences in the summer term.

9 ÷ 3 = 3

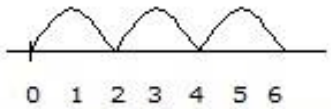
Year Two

÷ = signs and missing numbers

6 ÷ 2 = □	□ = 6 ÷ 2
6 ÷ □ = 3	3 = 6 ÷ □
□ ÷ 2 = 3	3 = □ ÷ 2
□ ÷ ▽ = 3	3 = □ ÷ ▽

Grouping
Link to counting and understanding number strand
Count up to 100 objects by grouping them and counting in tens, fives or twos
Find one half, one quarter and three quarters of shapes and sets of objects
6 ÷ 2 can be modelled as:
There are 6 strawberries.
How many people can have 2 each? How many 2s make 6?

6 ÷ 2 can be modelled as:



In the context of money count forwards and backwards using 2p, 5p and 10p coins

Practical grouping e.g. in PE

12 children get into teams of 4 to play a game. How many teams are there?

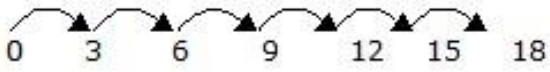
12 ÷ 4 = 3

Year Three

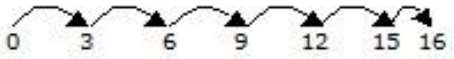
÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Understand division as sharing and grouping
18 ÷ 3 can be modelled as:
Sharing – 18 shared between 3 (see Year 1 diagram)

OR
Grouping - How many 3's make 18?

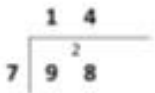


Remainders
16 ÷ 3 = 5 r1
Sharing - 16 shared between 3, how many left over?
Grouping – How many 3's make 16, how many left over?
e.g.



Written Methods
Children to begin to use short division method.

98 ÷ 7 becomes



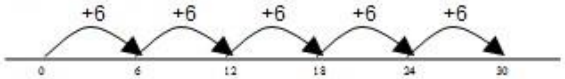
Answer: 14

DIVISION GUIDELINES

Year Four

÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Sharing and grouping
30 ÷ 6 can be modelled as:
grouping – groups of 6 placed on no. line and the number of groups counted e.g.



sharing – sharing among 6, the number given to each person

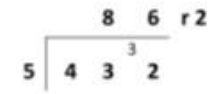
Remainders
41 ÷ 4 = 10 r1

41 = (10 x 4) + 1

Written Methods

Children to continue to use short division method and will begin to solve sums involving remainders.

432 ÷ 5 becomes



Answer: 86 remainder 2

Year Five

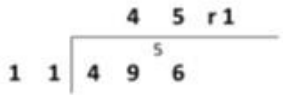
Sharing and grouping
Continue to understand division as both sharing and grouping (repeated subtraction).

Remainders
Quotients expressed as fractions or decimal fractions
61 ÷ 4 = 15 ¼ or 15.25

Written Methods

Children will divide numbers with up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

496 ÷ 11 becomes



Answer: $45\frac{1}{11}$

Long Division: Introduce the method in a simple way by limiting the choice of chunks, eg can we use 2 lots? Can we use 10 lots? Encourage children to make a key facts list for the divisor.

Year Six

Sharing, grouping and remainders as Year Five

Written Methods

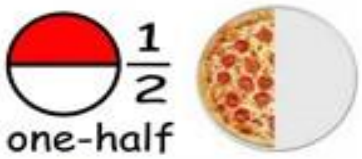
Children will divide numbers with up to 4 digits by a two-digit number using the formal written method of short division and interpret remainders appropriately for the context.

They will 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.

FRACTIONS GUIDELINES

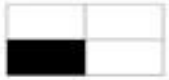
Year One

Recognise, find and name a half as one of two equal parts of an object, shape or quantity. The children place two halves together to make one whole.



The children will use doubling facts to help aid their understanding in finding half of a number or set of objects e.g to find1/2 of 8 they would use their doubling knowledge that 4 + 4 = 8.

Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.



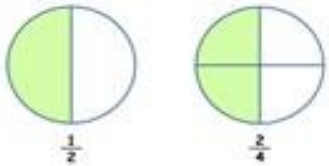
Children should connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as part of a whole. The children will begin to recognise that 2 quarters = the same as a half. They also start to find quarters by halving a number and halving it again using the related doubling fact
e.g. to find ¼ of 12 ½ of 12= 6 ½ of 6 = 3

Year Two

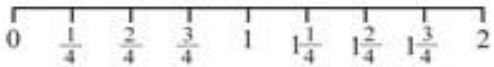
Recognise, find, name and write fractions 1/3, 1/4, 2/4, and 3/4 of a length, shape, set of objects or quantity

Write simple fractions
½ of 6 = 3
½ of 10 = 5

Recognise the equivalence of 2/4 and 1/2

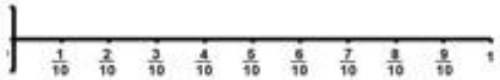


Pupils should count in fractions up to 10, starting from any number in quarters and halves using a number line.



Year Three

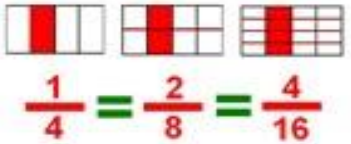
Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10



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

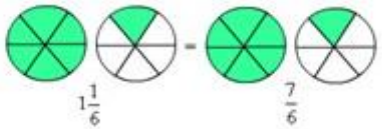
Recognise and show, using diagrams, equivalent fractions with small denominators



Add and subtract fractions with the same denominator within one whole,
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.

FRACTIONS GUIDELINES		
Year Four	Year Five	Year Six
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 Solve simple measure and money problems involving fractions and decimals to two decimal places.	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 2/5 + 4/5 = 6/5 = 1 1/5  Add and subtract fractions with the same denominator and denominators that are multiples of the same number 1/4 + 2/6 = 3/12 + 4/12 = 7/12 Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams Read and write decimal numbers and percentages as fractions 0.71 = 71/100 25% = ¼ Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents Solve problems which require knowing percentage and decimal equivalents of 1/2,1/4, 1/5,2/5,4/5 and those fractions with a denominator of a multiple of 10 or 25.	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 ¼ X ½ = 1/8 Divide proper fractions by whole numbers 1/3÷ 2 = 1/6 Associate a fraction with division and calculate decimal fraction equivalents 0.375 = 3/8 Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

CELEBRATING & SUPPORTING EVERY CHILD

Science Guidance

(Whole school including EYFS)

Rationale

Science stimulates and excites children's curiosity about phenomena and events in the world around them. It also satisfies this curiosity with knowledge. Through play and observation, children are learning scientific concepts from a very early age and, because of its practical nature, science can engage learners at many levels. Children learn to question and discuss science-based issues that may affect their own lives and the direction of society and the future world.

Aims and Objectives

At Avon House School, we believe that the teaching of science develops in pupils an interest and curiosity about the world in which they live, and fosters in them a respect for the environment. Through the framework of the National Curriculum, science aims to:

- Equip pupils to use themselves as starting points for learning about science, and to build on their enthusiasm and natural sense of wonder about the world
- Develop through practical work the skills of observation, prediction, investigation, interpretation, communication, questioning and hypothesizing, and increased use of precise measurement skills, mathematical skills, engineering skills, and ICT
- Encourage and enable pupils to offer their own suggestions, and to be creative in their approach to science, and to gain enjoyment from their scientific work
- Enable pupils to develop their skills of co-operation through working with others, and to encourage where possible, ways for pupils to explore science in forms which are relevant and meaningful to them
- Teach scientific enquiry through contexts taken from the National Curriculum for science
- Encourage pupils to collect relevant evidence and to question outcome and to persevere
- Encourage pupils to treat the living and non-living environment with respect and sensitivity
- Stress the need for personal and group safety by the correct usage and storage of resources
- Enable pupils to appreciate that we do not always know the answers and results when carrying out scientific enquiry
- Encourage pupils to use scientific vocabulary where appropriate

We will fulfil these aims by:

- Using the rich and stimulating environments that surround our school to enable us to provide opportunities for learning about life processes and living things, through observation, questioning and wonder
- Providing a wide range of interactive, practical activities for individual and group work that encourage the pupils to explore and find out and develop their understanding of key scientific ideas and make links between different experiences

- Planning in at least one STEM Project per term into Science lessons, to help children to develop their technological, engineering and mathematical skills within the context of their Science learning
- Developing the pupils' investigative skills and understanding of science through the use of questioning and giving them opportunity to express their findings and ideas to their peers
- Planning opportunities to develop skills predicting, asking questions, making inferences, drawing conclusions and making evaluations based on evidence and understanding
- Teaching scientific and mathematical language, including technical vocabulary and conventions, and drawing diagrams and charts to communicate scientific ideas
- Planning opportunities to extract information from sources such as reference books, ICT, CD/DVDs as well as through the internet, Smart board, science visits and visitors to school
- Working collaboratively in pairs or groups, listening to and sharing ideas and treating these with respect
- Encouraging pupils to 'think like scientists'

Teaching and Learning

At the Foundation Stage

Practical tasks and activities are used to support the teaching and learning of science. Children learn to make sense of science through stories, songs and rhymes, games, sand and water, construction on a large and small scale, imaginative play, outdoor play, role play, cooking, 2 and 3-D creative work with a range of materials, observing patterns in the environment, and in daily routines. Weekly walks also provide children to experience nature in their local area, which helps them to develop a sense of the world around them.

Key Stages One and Two

At KS1 pupils have two science lessons per week whilst in the Prep Dept they use these lessons to look at scientific elements in greater depth. During those lessons, pupils will complete a range of practical and written tasks. Scientific investigations will be carried out by pupils to help develop their understanding within topics, and their 'working scientifically' skills. Children will also have the opportunity to complete at least one STEM Project per term, which reflects the topic being taught in science lessons.

Inclusion

In school we aim to meet the needs of all our pupils by differentiation in our science planning and in providing a variety of approaches and tasks appropriate to ability levels. This will enable pupils with learning and/or physical difficulties to take an active part in scientific learning and practical activities and investigations and to achieve the goals they have been set. Some pupils will require closer supervision and more adult support to allow them to progress whilst more able pupils will be extended through differentiated activities. Where appropriate, pupils will be encouraged to work in mixed ability groups for select tasks. By being given enhancing and enriching activities, more able pupils will be able to progress to a higher level of knowledge and understanding appropriate to their abilities.

CELEBRATING & SUPPORTING EVERY CHILD

Assessment and Record Keeping

Pupils' progress is continually monitored and tracked throughout their time at Avon House School. End of unit module assessments will be used to assess progress and these results will be used alongside teacher assessment and Classroom Monitor targets.

Assessment will also include:

- Observing pupils at work, individually, in pairs, in a group, and in classes
- Questioning, talking and listening to pupils
- Considering work/materials/investigations produced by pupils together with discussion about this with them
- Assessments at the end of term to check understanding of modules taught

Marking

Marking Feedback is given to the pupils as soon as possible, and marking work will be guided by the school's Marking Policy. This aims to encourage and to give guidance for future work. Some marking will be immediate, depending on the activity and oral feedback is given to enhance understanding.

Health and Safety

With regard to science work in school, appropriate reminders will be given to pupils about potential hazards, hygiene and care of the equipment they are using. In addition, relevant PPE will be explained and used.

CELEBRATING & SUPPORTING EVERY CHILD

Computing Guidance

(Whole School including EYFS)

Rationale

At Avon House we will ensure that pupils:

- Understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms, decomposition, evaluation and data representation;
- Can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems;
- Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems;
- Are responsible, competent, confident and creative users of information and communication technology.

Aims and objectives

At Avon House we aim to provide our pupils with:

"A high-quality computing education equipping pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world."

- Primary National Curriculum 2014.

Values and attitudes

Through the computing curriculum pupils should be given the opportunity to:

- Understand and apply the five key principles of computing: collaboration; perseverance; tinkering; debugging; and creating
- Acknowledge the ownership of ideas and recognise the value of information held on computer systems
- Be aware of the security of their own and other people's information in electronic form
- Recognise the importance of printed output
- Be creative and persistent in assembling data and programs

- Consider the origin and quality of information and its fitness for purpose
- Evaluate critically their own and others' use of computing
- Recognise the strengths and limitations of computing, for example benefits of writing and reading on computer versus by hand and book
- Develop knowledge and understanding of important ideas, processes and skills and relate these to everyday experiences, including programming
- Learn about ways of thinking and finding out about and communicating ideas, including Internet research, emails, chat and blogs and how to use these tools safely.

Inclusion

All pupils regardless of race, or ability should have the opportunity to develop computing capability by:

- Using software which is appropriate to their ability and age
- Having equal access to teaching
- Having equal access to computing resources, which include: a computing suite with 22 machines; interactive whiteboards; one or more class computers in each classroom; printers; scanners; cameras; electronic control devices; digital recorders; headphones; microphones; programmable toys etc.

Data Protection

Please refer to the Avon House School Data Protection Policy and Privacy Notice.

Health and Safety

It is important that all electrical equipment is kept in good working order. To ensure the health and safety of the pupils and staff the following guidelines must be adhered to:

- Equipment should be situated away from water, drinks and food
- Pupils should always be supervised when using computer equipment
- All equipment should be switched off at the end of the working day
- Computer keyboards may be wiped clean with a soft damp cloth when switched off
- Computer screens should only be dusted with appropriate cloths
- Dust should be vacuumed safely from computers on a yearly basis
- Technical faults should be reported immediately to Joskos via the service desk (servicedesk@joskos.com) and logging a ticket
- All equipment should be PAT tested in line with the Avon House School Health and Safety guidelines (please refer to the Health and Safety Policy)
- The use of solvent cleaners and polishes is not allowed without express permission from the caretaker
- Staff will demonstrate and encourage the safe use of computers, including proper sitting position, eye stretches, resting periods.

CELEBRATING & SUPPORTING EVERY CHILD

Roles and Responsibilities

The school recognises that because of the wide spread use of computers within the school the responsibility must be shared between senior staff.

Shared responsibilities include:

- Maintaining Computing Guidance that reflects current technology and attitudes
- Overseeing schemes of work that reflect current resources, staff and pupil skills
- Monitoring and implementing schemes of work
- Organisation and distribution of hardware and software throughout the school
- Planning and implementing INSET programmes according to staff needs
- Ensuring that Health and Safety guidelines in computing are followed
- Acting as the link between Avon House School and Joskos

Teaching and Learning

Computing is taught in 50-minute sessions once a week from Foundation 2 to Year 6. Within the Foundation Stage, children in the Puffins class are taught as part of a carousel of activities on a weekly basis. Where appropriate, the Computing curriculum reflects the ideas of topic-based learning; allowing children from Foundation 2 to Year 2 a more diverse learning experience. Within the Computing curriculum the aim is to complete 2 projects per term although this can vary based on the pupils' knowledge and understanding of the topic area.

Expectations and Progression

The expectations will broadly correspond to the expectations of the National Computing Curriculum. Due to the expanding nature of computing technology in the world and school environment, it is recognised that subsequent year groups will learn aspects of the curriculum quicker than earlier year groups and therefore different activities might be covered in different classes in different years.

It is also recognised that the teaching staff's subject knowledge in computing can vary greatly and CPD will be offered to help teaching staff achieve the knowledge and understanding required to be confident in the delivery of the different curriculum areas. It is expected that teachers will undertake to expand their own personal computing knowledge on a regular basis by attending courses. The schemes of work for computing will include specific references to e-safety. (See Online Safety Guidance for further information).