Ysgol Eyton
CALCULATION POLICY

ADDITION

Nursery & Reception

Progression Step 1 Numeracy Framework:

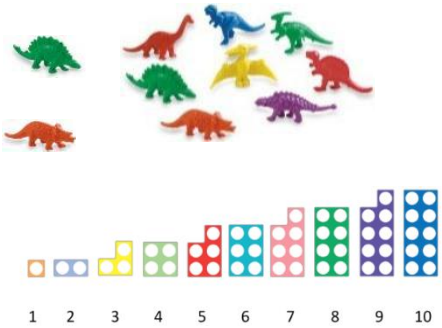
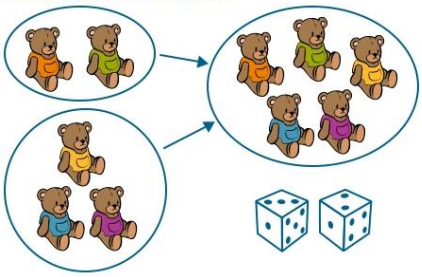
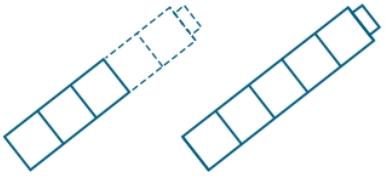
"I can understand and use the concept of 'one more' in my play." (augmentation)
"I can combine two groups of objects to find 'how many altogether?'" (aggregation)
"I can find and use number facts to compose a number (up to 10) in different ways." (number bonds)

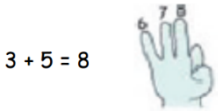
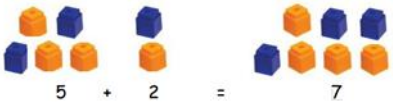
Progression Step 1 Maths & Numeracy AoLE:

"I can use mathematical language to describe quantities, and to make estimates and comparisons such as 'more than', 'less than' and 'equal to'."
"I can communicate how sets change when objects are added to and taken away from them."

CONCRETE RESOURCES:	**VOCABULARY:** add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…, how many more to make…?, how many more is… than…?
• Concrete objects – dinosaurs, animals, buttons, balloons, cubes etc. • Multilink • Chalk • Hoops and beanbags • Numicon	

USEFUL VIDEOS: https://www.youtube.com/watch?v=Ob1XW_1H4_I (How to use Numicon)

METHOD/GUIDANCE	**EXAMPLE/REPRESENTATION**
Using a range of practical resources and real-life contexts, pupils develop their understanding of the concept of addition through counting activities.	How many dinosaurs are there?  What about if I give you two more? How many are there now?  
Children will develop an understanding of addition by **both aggregation and augmentation**.	Aggregation 1. Combining two or more quantities  2. Augmentation of one quantity 

Children are introduced to the addition symbol (+) and use images to represent the calculation.	There are 2 birds. Another bird flies in. How many are there altogether? 
Children store the larger number mentally and use fingers to count on.	Count on <u>from the larger number</u>. A child will choose the larger number, even when it is not first in the number sentence and count on from there; (5 in your head) 'six, seven, eight' using their fingers: 
Children represent an addition number sentence pictorially and are able to solve simple addition number sentences using objects or fingers. <u>Children will begin to explain their reasoning.</u>	 
Children will be introduced to number tracks. They can be drawn, using chalk, outside. This will help children develop their understanding of addition.	 
MENTAL STRATEGIES: - Develop a mental image of the number system. - Understand the value of a number - Counting forwards and backwards - Recall of number bonds to 10	

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CALCULATION POLICY

ADDITION

YEAR 1

Progression Step 1 Numeracy Framework:
"I can understand and use the concept of 'one more' in my play." (augmentation)
"I can combine two groups of objects to find 'how many altogether?'" (aggregation)
"I can find and use number facts to compose a number (up to 10) in different ways." (number bonds)

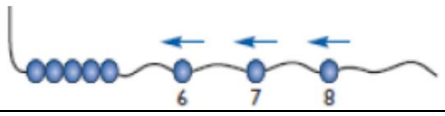
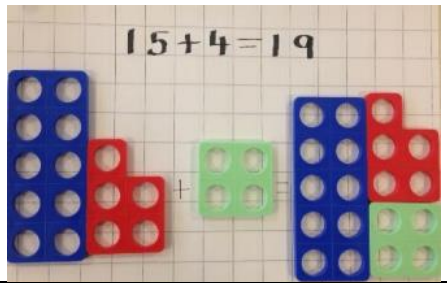
Progression Step 1 Maths & Numeracy AoLE:
"I can use mathematical language to describe quantities, and to make estimates and comparisons such as 'more than', 'less than' and 'equal to'."
"I can communicate how sets change when objects are added to and taken away from them."

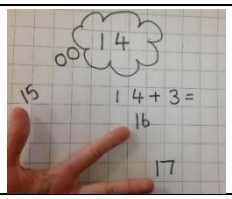
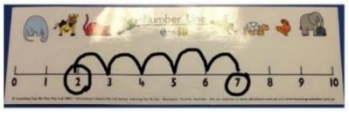
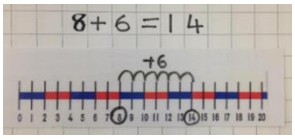
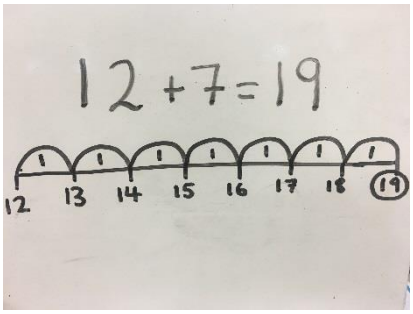
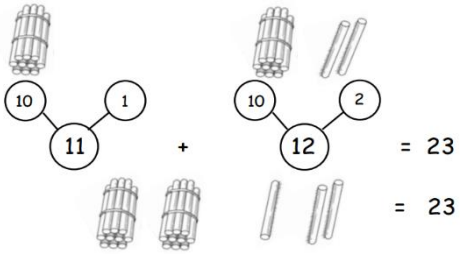
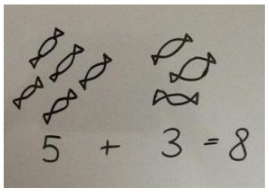
Progression Step 2 Numeracy Framework:
"I can check subtraction using addition."
"I can use mental strategies to add and subtract at least 2-digit numbers."
"I can use mental strategies to recall number facts within 20."
"I can use different combinations of money to pay for items up to at least £2 and calculate the change."

Progression Step 2 Maths & Numeracy AoLE:
"I have explored additive relationships, using a range of representations. I can add and subtract whole numbers, using a variety of written and mental methods."
"I have explored commutativity with addition and multiplication and I can recognise when two different numerical expressions describe the same situation but are written in different ways."
"I can find missing numbers when number bonds (+ -) and multiplication facts (x ÷) are not complete."

CONCRETE RESOURCES:
- Bead strings
- Number tracks
- Numicon
- Prepared number lines
- 100 number square
- Dienes – <u>use when not crossing boundary</u>
- Straws and elastic bands - <u>use when crossing boundary</u>
- Concrete objects – dinosaurs, animals, buttons, balloons, cubes etc.

VOCABULARY: number bonds, add, more, plus, make, sum, total, altogether, inverse, double, near double, equals, is the same as (including equals sign), one more, two more… ten more, how many more to make…?, how many more is… than…?, how much more is…? Count on.

METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Children will be taught to use a number track to support addition.	4 + 2 = 6 
Bead strings and counting sticks will be used to support addition.	5 + 3 = 8 
Numicon will be used to support addition.	

Children will store the larger number mentally and count on using their fingers or objects.	
Children will use a prepared number line to solve simple addition stories and number sentences.	2 + 5 = 7  
Children will be taught how to solve simple addition stories with the support of a 100 number square.	11 + 7 = 18 
Children are taught how to use a blank number line for addition and then encouraged to draw their own number line to help solve problems. Children will begin with TU + U that <u>lie within the tens boundary using dienes</u> then move onto TU + U that <u>cross the tens boundary using straws.</u>	
Children will partition numbers into tens and units <u>using dienes when adding two 2-digit numbers that lie within the tens boundary.</u>	
Children will solve one-step addition problems (including missing number problems) using concrete, pictorial and abstract representations of numbers. Children will be introduced to the concept of inverse meaning that addition 'undoes' subtraction and vice versa.	I have 5 sweets and I am given 3 more. How many do I have altogether?  Sarah has 3 balloons and Tom has 9. How many do they have altogether? 

MENTAL STRATEGIES:
- Know addition can be carried out in any order (commutative)
- Add 1- and 2-digit numbers to 20 including 0
- Number bonds to 20
- Doubles of numbers up to and including double 10
- Adding 10 to a single digit number
- Identify 1 more than a given number
- Mentally picture the number line calculation method

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CALCULATION POLICY

ADDITION

YEAR 2

Progression Step 2 Numeracy Framework:

"I can check subtraction using addition."
"I can use mental strategies to add and subtract at least 2-digit numbers."
"I can use mental strategies to recall number facts within 20."
"I can use different combinations of money to pay for items up to at least £2 and calculate the change."

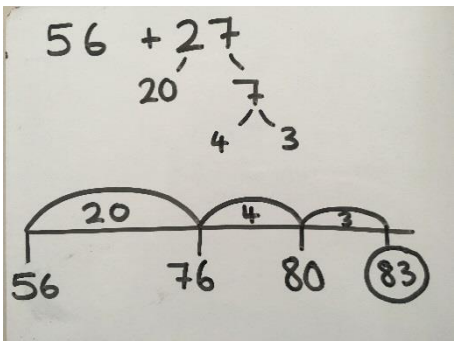
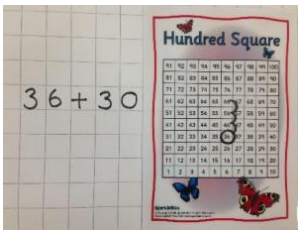
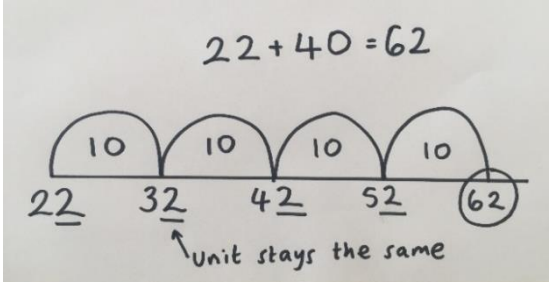
Progression Step 2 Maths & Numeracy AoLE:

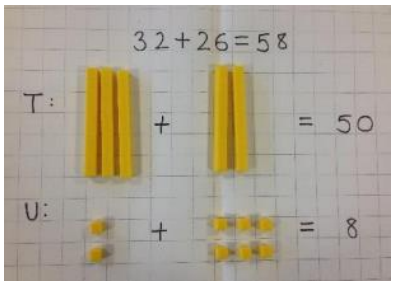
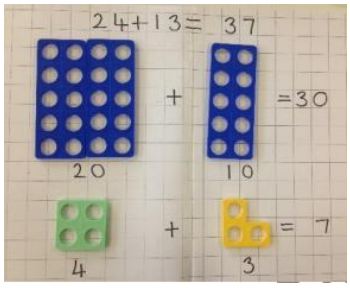
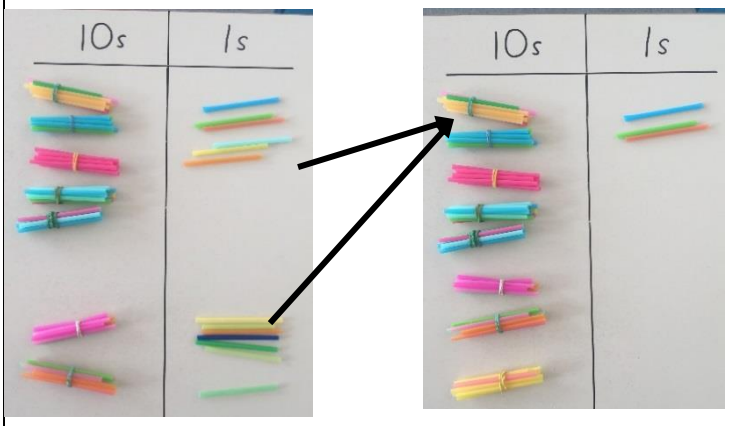
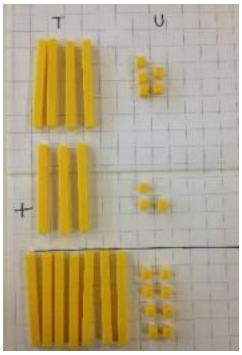
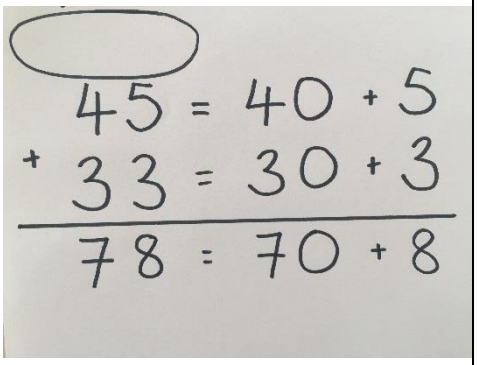
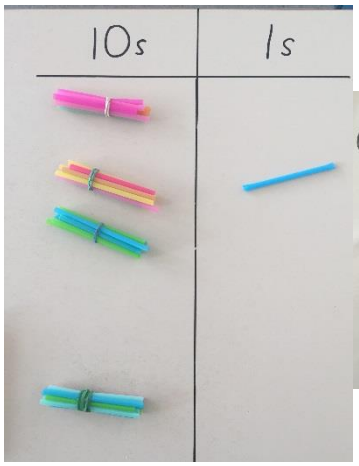
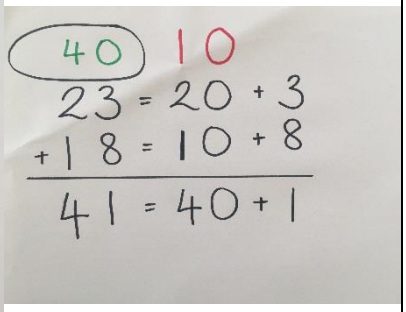
"I have explored additive relationships, using a range of representations. I can add and subtract whole numbers, using a variety of written and mental methods."
"I have explored commutativity with addition and multiplication and I can recognise when two different numerical expressions describe the same situation but are written in different ways."
"I can find missing numbers when number bonds (+ -) and multiplication facts (x ÷) are not complete."

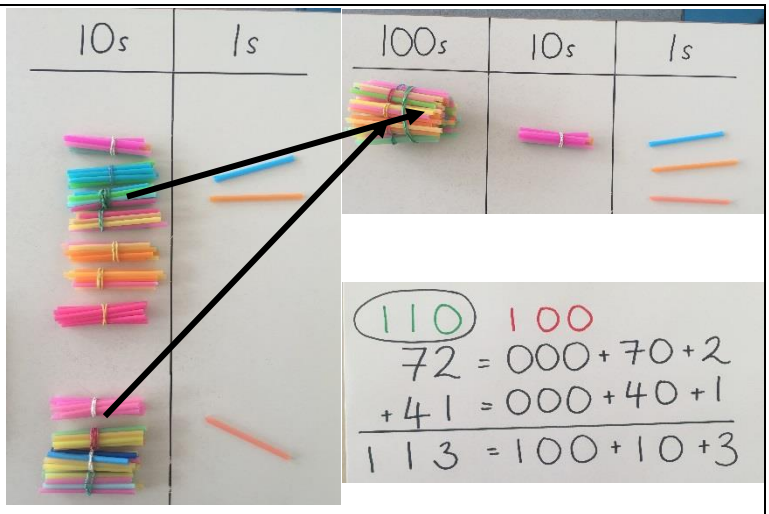
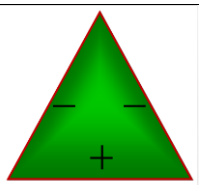
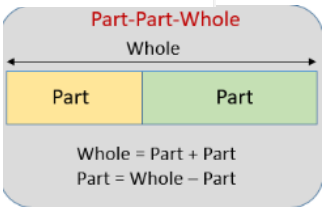
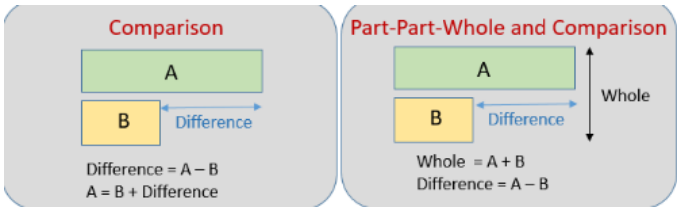
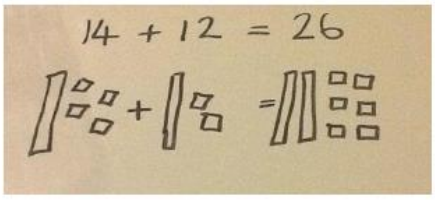
CONCRETE RESOURCES:

- Dienes – <u>use when not crossing boundary</u>
- Straws and elastic bands - <u>use when crossing boundary</u>
- Numicon
- 100 number square

VOCABULARY: partition, recombine, carry over, add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more… ten more… one hundred more, how many more to make…?, how many more is… than…?, how much more is…?, tens boundary, home column

METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Children will use a blank number line to solve 2d + 2d when crossing boundaries. Children will partition the smaller number and begin their number line from the larger number. This written method should be focused on at the beginning of the year, before introducing the concept of a column layout.	
Children will add multiples of 10 using a hundred square or a blank number line.	 

Children will add by partitioning using dienes and Numicon.	 
Children will partition and recombine numbers into tens and units when adding two 2-digit numbers <u>that cross the tens boundary using straws.</u>	**56 + 27 = 83** 
Children begin to set out TU + TU <u>(that lie within the tens boundary)</u> in columns <u>using dienes</u> and record as expanded column addition. "Partition, add, recombine!"	 
Children begin to set out TU + TU <u>(that cross the tens boundary)</u> in columns <u>using straws</u> and record as expanded column addition. Carried values should be recorded **above** the question values in the relevant column.	 

Children begin to set out TU + TU (that cross the hundreds boundary) in columns using straws and record as expanded column addition. Children will use their estimate to indicate when a hundreds column will be required.	
Recognise and use inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. *Use fact family triangles and bar modelling to solve missing number problems. Children will solve simple addition problems using concrete, pictorial and abstract representations, including those involving number, quantities and measures and explaining reasoning behind their calculations.	84 - 56 = ☐ 56 + ☐ = 84    George has 14 strawberries and Jess has 12 strawberries. How many strawberries are there altogether? 

MENTAL STRATEGIES:

- Know that addition is the inverse of subtraction
- Add numbers mentally, including:

a 2-digit number and units
a multiple of 10 to a 2-digit number
two 2-digit numbers
three 1-digit numbers

- Mentally picture the number line calculation method
- Use knowledge of inverse to check calculations and solve missing number problems
- Use knowledge of number bonds to 10 to calculate numbers bonds to 100
- Count on in tens from any given number (e.g 19 – 29 – 39 – 49 etc)

Ysgol Eyton
CALCULATION POLICY

ADDITION

YEAR 3

Progression Step 2 Numeracy Framework:

"I can check subtraction using addition."
"I can use mental strategies to add and subtract at least 2-digit numbers."
"I can use mental strategies to recall number facts within 20."
"I can use different combinations of money to pay for items up to at least £2 and calculate the change."

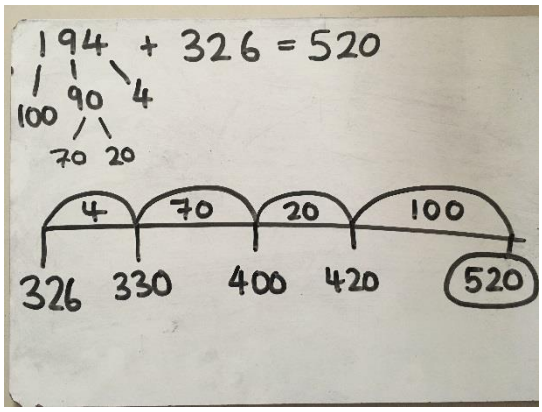
Progression Step 2 Maths & Numeracy AoLE:

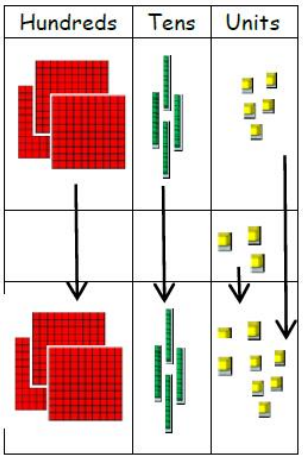
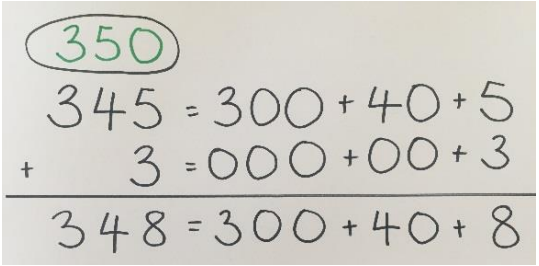
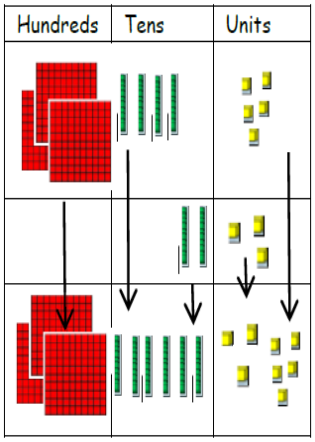
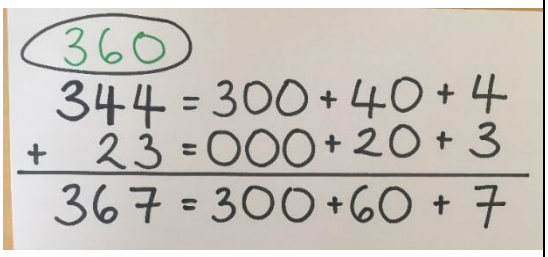
"I have explored additive relationships, using a range of representations. I can add and subtract whole numbers, using a variety of written and mental methods."
"I have explored commutativity with addition and multiplication and I can recognise when two different numerical expressions describe the same situation but are written in different ways."
"I can find missing numbers when number bonds (+ -) and multiplication facts (x ÷) are not complete."

CONCRETE RESOURCES:

- Dienes – <u>use when not crossing boundary</u>
- Straws and elastic bands – <u>use when crossing boundary</u>
- Place value arrow cards

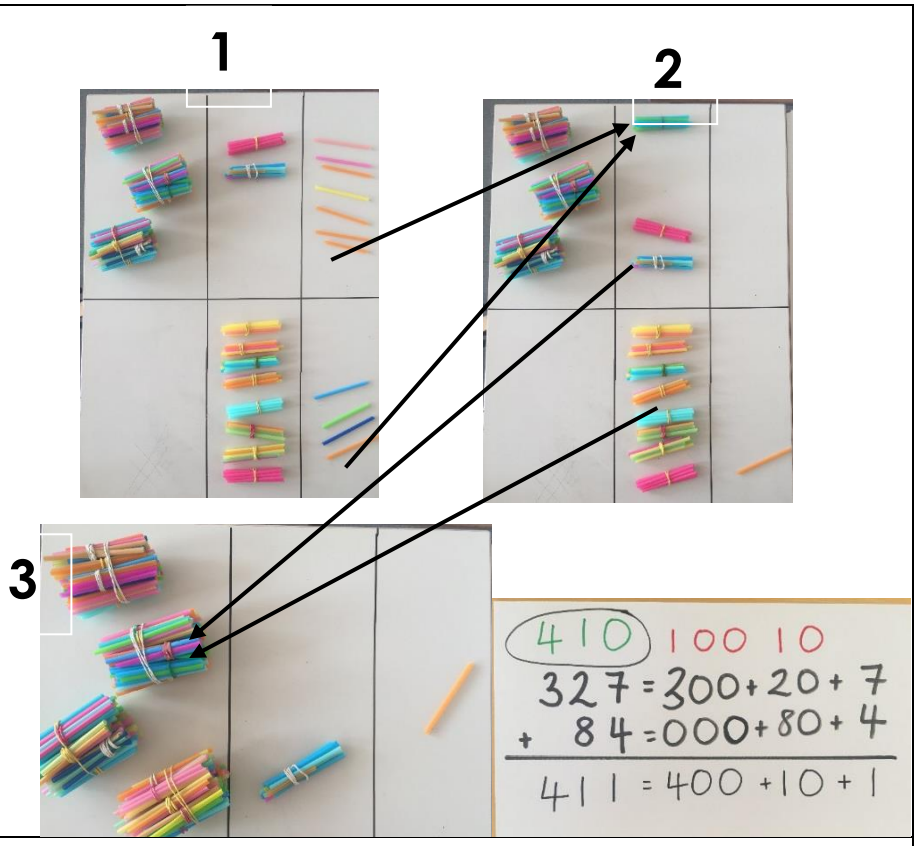
VOCABULARY: partition, recombine, carry over, add, increase, total, plus, sum, more, altogether, column addition, estimate, rounding, inverse, double, near double, one more, ten more… one hundred more, how many more to make …? how many more is… than …? how much more is…?, tens boundary, hundreds boundary, efficiency vs. understanding, home column

METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Children revisit using a blank number line to add 3 digit numbers when crossing boundaries. Children will partition the smaller number and begin their number line from the larger number. This written method should be focused on at the beginning of the year to remind children of alternative informal written layouts.	

Children set out HTU + U, HTU + TU and HTU + HTU <u>(that lie within the tens boundary)</u> in columns <u>using dienes</u> and record as expanded column addition. "Partition, add, recombine!"	   

Children set out HTU + U, HTU + TU and HTU + HTU <u>(that cross the tens and hundreds boundaries)</u> in columns <u>using straws</u> and record as expanded column addition.

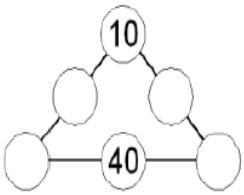
Partition, add, recombine!

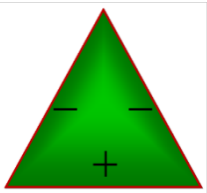


Children will solve one and two-step addition problems (including missing number problems).

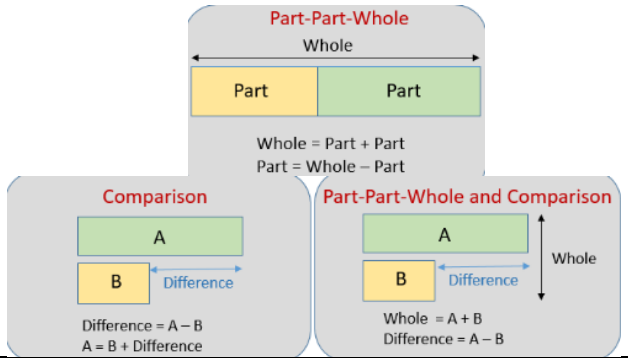
Children will use fact family triangles and bar modelling to solve missing number problems <u>explaining reasoning behind their choice of operation and calculations.</u>

This number triangle has missing numbers. The numbers along each edge must add up to 90. Put all the numbers: 20, 30, 50 and 60 in the circles to make the totals correct.





Fact family triangles



MENTAL STRATEGIES:

- Mentally picture the number line calculation method
- Add numbers mentally, including:

a three-digit number and a single digit number
a 3-digit number and multiples of 10
a 3-digit number and multiples of 100

- Estimate the answer to a calculation using rounding and use inverse operations to check answers
- Know number pairs that total 1000 (multiples of 100)
- Calculate 10 or 100 more than any given number

Ysgol Eyton
CALCULATION POLICY

ADDITION

YEAR 4

Progression Step 2 Numeracy Framework:
"I can check subtraction using addition."
"I can use mental strategies to add and subtract at least 2-digit numbers."
"I can use mental strategies to recall number facts within 20."
"I can use different combinations of money to pay for items up to at least £2 and calculate the change."

Progression Step 2 Maths & Numeracy AoLE:
"I have explored additive relationships, using a range of representations. I can add and subtract whole numbers, using a variety of written and mental methods."
"I have explored commutativity with addition and multiplication and I can recognise when two different numerical expressions describe the same situation but are written in different ways."
"I can find missing numbers when number bonds (+ -) and multiplication facts (x ÷) are not complete."

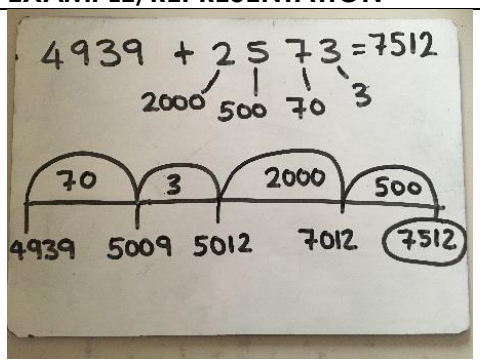
Progression Step 3 Numeracy Framework:
"I can add and subtract numbers using whole numbers and decimals." (any no. of digits)
"I can add and subtract totals less than £100 using correct notation, e.g. £28.18 + £33.45."

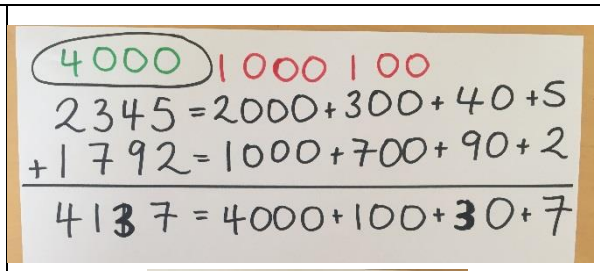
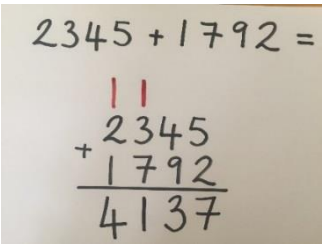
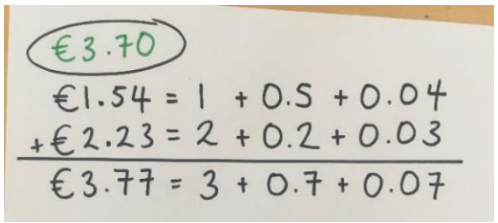
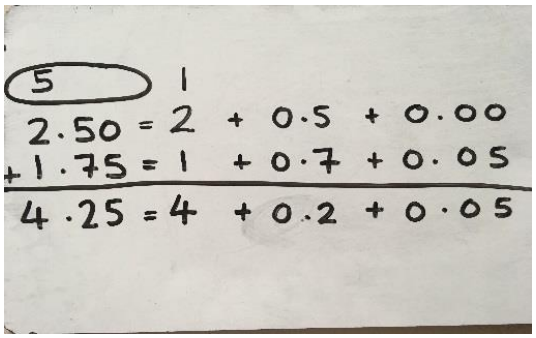
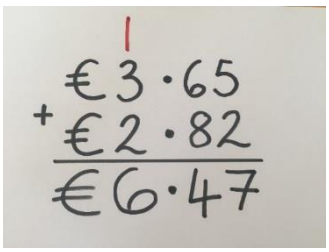
Progression Step 3 Maths & Numeracy AoLE:
"I can use the four arithmetic operations confidently, efficiently and accurately with integers and decimals and I can combine these using distributive, associative and commutative laws where appropriate."

CONCRETE RESOURCES:

- Dienes – <u>use when not crossing boundary</u>
- Straws and elastic bands – <u>use when crossing boundary</u>
- Money – euros, cents, pounds, pennies

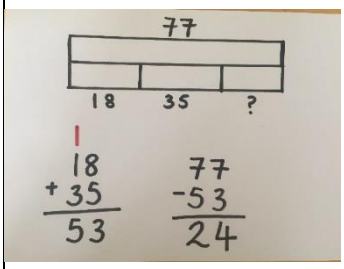
VOCABULARY: add, addition, carry over, more, plus, increase, sum, total, altogether, score, double, near double , tens boundary, hundreds boundary, thousands boundary, inverse, partition, recombine, efficiency vs. understanding, home column

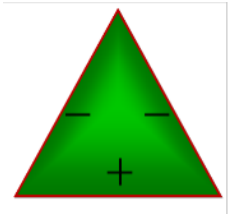
METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Children revisit using a blank number line to add 4-digit numbers when crossing boundaries. Children will partition the smaller number and begin their number line from the larger number. This written method should be consolidated at the beginning of the year to remind children of alternative informal written layouts.	

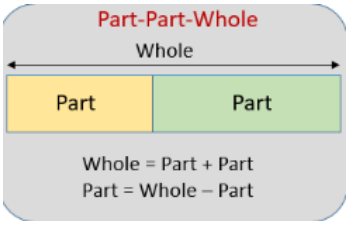
Children will continue to use expanded column addition with numbers up to 4 digits. They will be introduced to the formal written method of (compact) column addition alongside expanded column addition and should be using compact by the end of the year. Use dienes and straws to model. "Partition, add, recombine!" Carried values to be recorded **above** the question values in the relevant column.	 
Children will use money as a visual representation before adding decimal numbers with the same number of decimal places when solving money and measure problems using expanded column addition. "Partition, add, recombine!"	 
Children will add decimals when solving money and measure problems using expanded column addition. They will be introduced to the formal written method of (compact) column addition by the end of the year.	 

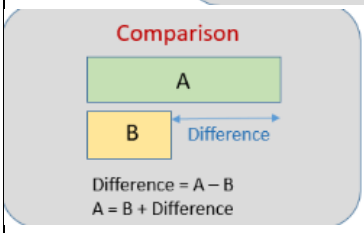
Children will use fact family triangles and bar modelling to solve two-step problems using formal jottings and <u>explaining reasoning behind their calculations</u> (bar modelling – see useful video)

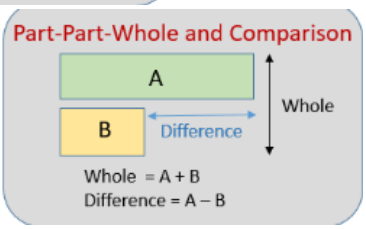
Seb has 77 cubes. He builds two towers.
One tower uses 18 cubes and one tower uses 35 cubes.
How many cubes does he have left over?











MENTAL STRATEGIES:
- Add numbers mentally, including:
a four-digit number and multiples of one thousand
- Use knowledge of doubles and halves to derive related facts (e.g 15 + 16 = 31 because 15 + 15 = 30 and 30 + 1 = 31)
- Mentally picture the number line calculation method
- Know number pairs that total 1000 (multiples of 10)
- Estimate the answer to a calculation using rounding and use inverse operations to check answers

Ysgol Eyton
CALCULATION POLICY

ADDITION

YEAR 5

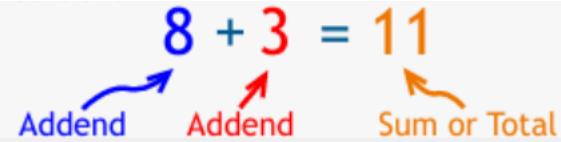
Progression Step 3 Numeracy Framework:
"I can add and subtract numbers using whole numbers and decimals." (any no. of digits)
"I can add and subtract totals less than £100 using correct notation, e.g. £28.18 + £33.45."

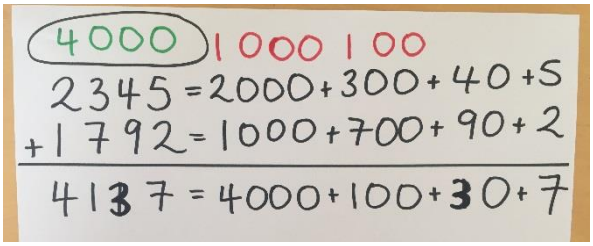
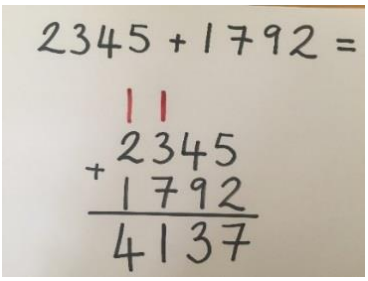
Progression Step 3 Maths & Numeracy AoLE:
"I can use the four arithmetic operations confidently, efficiently and accurately with integers and decimals and I can combine these using distributive, associative and commutative laws where appropriate."

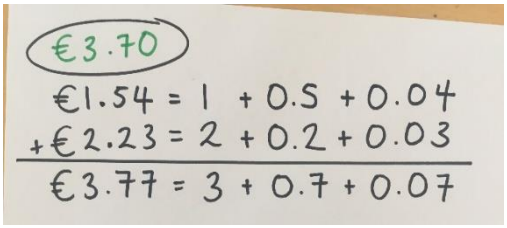
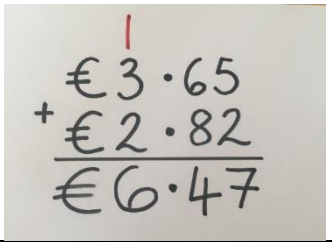
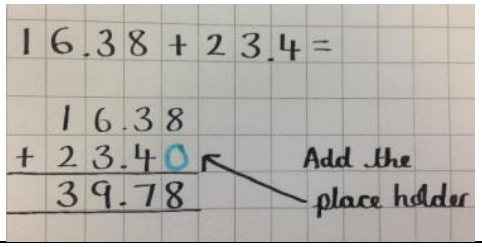
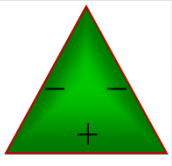
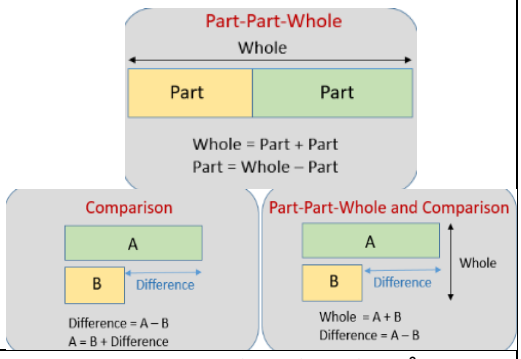
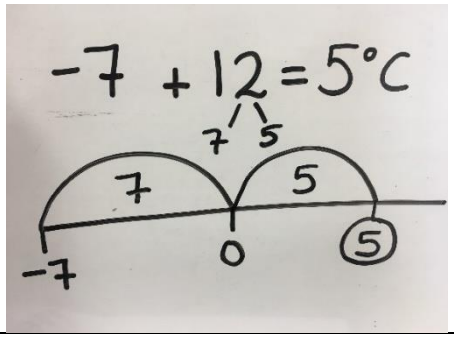
CONCRETE RESOURCES:

- Dienes – use when not crossing boundary
- Straws and elastic bands – use when crossing boundary
- Money – euros, cents, pounds, pennies

VOCABULARY: efficiency vs. understanding, partition, recombine, carry over, written method, add, addition, more, plus, increase, sum, total, altogether, score, tens boundary, hundreds boundary, thousands boundary, units boundary, tenths boundary, inverse, home column



METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Expanded column addition should be revisited at the beginning of the year making strong links between the expanded and compact methods. Children will add numbers with more than 4-digits using the formal written method of (compact) column addition.	 
Children will use money as a concrete representation before adding decimal numbers with the same number of decimal places using expanded column addition.	

Children will then move on to adding decimals using the formal written method of (compact) column addition. "Partition, add, recombine!"	 
Children will add decimal numbers with a different number of decimal places using the formal written method of (compact) column addition using 0 as a place value holder.	
Solve multi-step problems (that may include subtraction) using formal jottings and <u>explaining reasoning behind their choice of operation and calculation</u> (bar modelling and fact family triangles)	 
Solve negative number word problems counting forwards and backwards through zero with positive and negative whole numbers.	In the morning, the temperature in Milan is -7˚C. It rises by 12 degrees during the morning. What is the temperature at midday? 

MENTAL STRATEGIES:

- Add numbers mentally with increasingly large numbers (e.g. 10 162 + 2300 = 12 462)
- Mentally add tenths (e.g. 0.2 + 0.6 = 0.8) and 1-digit whole numbers and tenths (8 + 0.3 = 8.3)
- Use number bonds to 100 knowledge to calculate complements to one using hundredths (e.g. 0.83 + 0.17 = 1)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

Ysgol Eyton
CALCULATION POLICY

ADDITION

YEAR 6

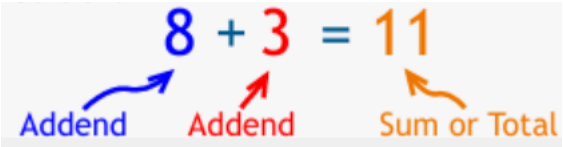
Progression Step 3 Numeracy Framework:
"I can add and subtract numbers using whole numbers and decimals." (any no. of digits)
"I can add and subtract totals less than £100 using correct notation, e.g. £28.18 + £33.45."

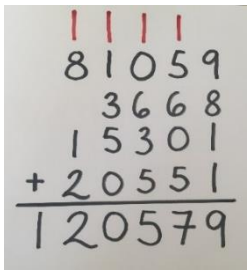
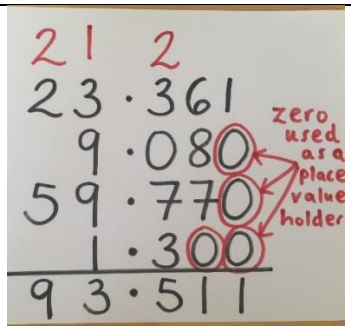
Progression Step 3 Maths & Numeracy AoLE:
"I can use the four arithmetic operations confidently, efficiently and accurately with integers and decimals and I can combine these using distributive, associative and commutative laws where appropriate."

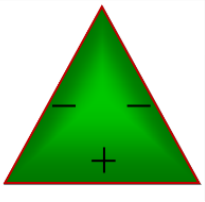
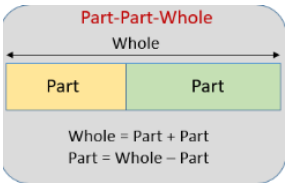
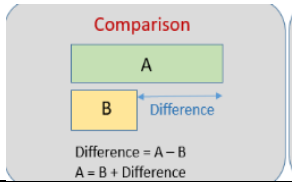
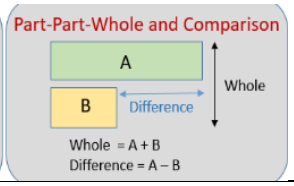
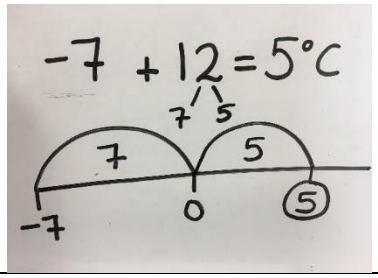
CONCRETE RESOURCES:

- Dienes – <u>use when not crossing boundary</u>
- Straws and elastic bands – <u>use when crossing boundary</u>
- Money – euros, cents, pounds, pennies

VOCABULARY: efficiency, order of operations, column addition, add, in total, answer, tens boundary, hundreds boundary, thousands, carry over, thousands boundary, millions boundary, units boundary, tenths boundary, hundredths boundary, decimal place, inverse, home column



METHOD/GUIDANCE	EXAMPLE/REPRESENTATION
Children will add several numbers of increasing complexity using the formal written method of (compact) column addition.	**81 059 + 3 668 + 15 301 + 20 551 + 120 579** 
Children will add several decimals numbers with a different number of decimal places using the formal written method of (compact) column addition.	

Solve multi-step problems (that may include subtraction) using formal jottings and <u>explaining reasoning behind their calculations</u> (bar modelling and fact family triangles).	   
Solve negative number word problems counting forwards and backwards through zero with positive and negative whole numbers.	In the morning, the temperature in Milan is -7˚C. It rises by 12 degrees during the morning. What is the temperature at midday? 
MENTAL STRATEGIES: - Mentally add numbers with increasingly large numbers (e.g 10 162 + 2300 = 12 462) - Add decimal numbers mentally (up to 2 decimal places) - Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.	