

Happy together, safe together, learning together... .... Where all members of the Craylearning community feel happy and safe to take risks in their learning, learn from their mistakes and develop the skills to prepare them for their future, as lifelong learners.

## CALCULATION PROGRESSION POLICY 2022



| + | Skill: | Concrete: | Pictorial: |  | Abstract: |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Add one- <br> digit <br> numbers <br> within 10 <br> Add one and two-digit numbers to 20 <br> Read/write/i nterpret statements involving addition (+) and equals (=) signs. | Pupils use concrete objects: <br> Plastic animals, counters, straws, Numicon: <br> Unifix: <br> Rekenreks: <br> Alongside pictorial charts and mats: Ten frames, part-whole models, Place Value Charts, Hungarian ten frames <br> Numicon tens number line: <br> Problems should include terms: part-part whole, put together, add, altogether, total, take away, distance between, more than and less than, so pupils develop concept of +/- and use operations flexibly. | Children draw part-whole models (top image), discrete (middle image) and continuous bar models (bottom image). <br> Children also represent counters and ten frames and beads on a Rekenrek. | Progress from counting on in ones to bigger, efficient jumps using Rekenreks and number lines. Draw jumps on marked and blank number lines: $5+4=9$ <br> When adding one- digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. In Year 1, this is only done just by counting on. Children make own pictorial representations: $8+7=$ | Represent/use number bonds (and related subtraction facts) within 20. <br> Missing number problems (eg $16=?+9)$ <br> Memorise/reason with bonds to 20 in several forms (eg 9+7=16; 16-7 = 9; 7 = 16-9). Pupils should realise the effect of adding or subtracting zero and establish +/- as related operations. <br> Pupils combine and increase numbers, counting forwards and backwards. <br> Part + part = whole |


| + | Skill: | Concrete: | Pictorial: | Abstract: |
| :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & Y \\ & 2 \end{aligned}$ | $\begin{aligned} & \text { TO + O } \\ & \text { TO + tens } \\ & \text { TO + TO } \end{aligned}$ | Pupils use concrete objects alongside place value charts, part-whole models, ten frames and numberlines: | Efficient jumps drawn on marked and blank number line (progressing to mental jumps): <br> Bridging ten- apply number bond to ten knowledge: | Informal mental jottings: $\begin{aligned} & 35+47=82 \\ & 47+30=77 \\ & 77+3=80 \\ & 80+2=82 \end{aligned}$ |
|  | Add three 1 digit numbers <br> [Show addition of two or more numbers can be done in any order.] | $7+6+3=16$ <br> 10 | First when adding onto TO might need to count on in ones: | Partitioning $35+47=82$ |
|  |  |  |  | $\begin{array}{r} 40+30=70 \\ 7+5=12 \end{array}$ |
|  |  | Base ten: $58+30=88$ | Progress to applying number bond knowledge and jumping to multiples of ten: | expanded written method (vertical): |
|  |  |  |  | $\begin{gathered} 47+35=82 \\ 40+7 \\ 30+5 \\ \hline 70+12 \end{gathered}$ |
|  |  | Base ten and place value charts with regrouping: | [Also jumps can be in 10s and then1s] <br> $+30$ <br> $47+35=82$ | Recording addition in columns supports place value and prepares for formal written methods with larger numbers. |
|  |  | $38+23=61$Tens Ones <br> 宜  | Draw base ten and PV charts: Draw part-part-part models: $38+23=61$ | Recall and use addition facts to 20 fluently. Derive and use related facts up to 100. <br> Practise + to 20 to derive facts such as using $3+7=10$ to calculate $30+70=$ $100,100-70=30$ and $70=100-30$. |
|  |  |  |  | Check calculations, including by adding numbers in a different order to check addition and using inverse relationship Establishes commutativity and associativity of addition. <br> Part + part + part = whole |
|  |  |  |  | $\underset{\text { Addend }}{\downarrow}+\underset{\substack{\downarrow \\ \text { Addend }}}{\stackrel{4}{\downarrow}}+\underset{\text { Addend }}{\downarrow} \quad \underset{\substack{\downarrow \\ \text { sum }}}{\stackrel{20}{\downarrow}}$ |





## SUBTRACTION

## YR-6 at The Craylands

| Skill: |
| :--- | :--- | :--- | :--- | :--- | :--- |




|  | Skill: | Concrete: | Pictorial: | Abstract: |
| :---: | :---: | :---: | :---: | :---: |
| $Y$ $r$ 3 | TO - то <br> HTO - TO <br> HTO - HTO <br> Introduce <br> formal written methods of column addition | All children use base 10/place value counters and place value charts to introduce/support formal column method: 435-273 = 162 <br> Column method using place value counters. 234-88: | Represent base ten or the place value counters pictorially in drawn place value charts; remembering to show what has been exchanged.$234-88=$$100 s$ $10 s$ $1 s$ <br> 00 000 0000 <br>  00 88 <br>  88 80 <br> 1 480 $8 \varnothing$ <br> 4 6  <br> Draw part-whole and Bar Models: <br> Draw blank number lines: <br> Find the difference by counting on or back: <br> Progress to $436-389=47$ | Expanded vertical $\begin{gathered} 700+20+1 \\ -200+20+7 \\ 500+10+4=514 \end{gathered}$ <br> Some children might need to be taught the expanded method above. Most move straight to column. All should also use mental methods. <br> Column method of subtraction: No exchanges: 874-523=351 <br> With exchanges: <br> Ensure children draw/write out their calculation alongside any concrete resources so they can see the links to the written column method and fully understand when to exchange. <br> Estimate answers and use inverse to check. <br> Use number facts and place value and apply methods learnt, including part-whole and bar model, to solve |



## MULTIPLICATION

## YR-6 at The Craylands

| X | Skill: | Concrete: | Pictorial: | Abstract: |
| :---: | :---: | :---: | :---: | :---: |
|  | Explore double facts and how quantities can be distributed evenly <br> Know some double facts (up to 10 ) <br> Represent patterns, including evens | Use concrete resources and real objects and contexts to develop understanding: Numicon, Rekenrek, counters, ten frames, bead strings., number tracks and number lines <br> How many socks in three pairs? 18888 | Show and encourage children to make own symbolic (pictorial) recordings: <br> 3 pairs, 2 socks in each pair: <br> Use number tracks/lines to spot even numbers: | Show children how to record doubles in addition sentences: $2+2=4$ <br> Introduce idea of repeated addition; 2 and 2 and 2 is |
|  | Yr1: Solve onestep problems using concrete objects, pictorial representations and arrays (with the support of the teacher) <br> Count in steps of 2, 5 and 10 <br> Yr2: Calculate statements for multiplication within the $2 x$, $5 x, 10 x$ and $3 x$ multiplication tables and write them using the multiplication and equals signs. <br> [Show multiplication of two numbers can be done in any order.] | Use concrete resources and real objects and contexts to develop understanding: <br> Numicon and numicon number lines, bead strings/Rekenrek -00000-00000-00000-00000- <br> counters and ten frames: <br> , bead strings., number tracks and number lines. Build arrays with counters. | Encourage children to draw equal groups of: <br> Encourage children to draw arrays, bar models and other representations: <br> Draw jumps on marked and blank number lines: | In year 1 children count in steps of 2,5 and 10 <br> Children represent multiplication as repeated addition: $5+5+5+5=20$ <br> They are not expected to record multiplication using $x$ symbol. <br> In Year 1, children use concrete and pictorial representations to solve problems. <br> In Year 2, children are introduced to the multiplication symbol: $\begin{aligned} & 4 \times 5=20 \\ & 5 \times 4=20 \end{aligned}$ <br> ... groups of ... $=$... <br> Multiplication: |

## Skill:

 Yr 3Write/calculate
statements
using the
multiplication
tables that they
know
(progressing to formal written methods)
TO $\times 0$
(multiplier is
2/3/4/5/8/10

## Yr4:

Use formal
written layout:

TO x 0
HTO x 0

## Concrete: <br> Use concrete resources to develop tables: <br> e.g. Numicon: <br> 

 understanding of new multiplication facts/e.g. Cuissenaire:


Use base ten/ place value counters and place value charts to introduce and represent:
e.g. $245 \times 4=$


$4 \times 15=$


Represent base ten or the place value counters pictorially in drawn place value charts; remembering to show what has been exchanged.

$6 \times 23=$


## Abstract:

Expanded written multiplication method:


Formal short multiplication method:

|  | H | T | O |
| :---: | :---: | :---: | :---: |
|  | 2 | 4 | 5 |
| $\times$ |  |  | 4 |
|  |  |  |  |

Use mental methods:
Practise mental methods and extend this to HTO numbers to derive facts, for example $200 \times 3=$ 600 into $600 \div 3=200$.
Grid methods can be used to show mental method or to link with Place Value Chart concrete methods:


Yr3: Recall and use multiplication facts for the 3, 4,6 and 8 multiplication tables.

Yr 4:
Recall multiplication facts to $12 \times 12$.
Use place value, known \& derived facts to multiply mentally, including x by 0/1; x 3 numbers. Recognise/use factor pairs and commutativity in mental calculations


| $\div$ | DIVISION |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\div$ | Skill: | Concrete: | Pictorial: | Abstract: |
| Y R | Explore how quantities can be distributed evenly: | Use concrete and real objects in real life contexts: Share 8 buns between two people. <br> 6 beanbags shared between 2 hoops: | Children are encouraged to record concrete representations pictorially in their own way: e.g. | Children should not be introduced to the division symbol in reception or year 1. Children may be introduced to the words share and equally. |
| $Y$ $R$ 1 / 2 | Yr1: <br> Solve one step problems using multiplication (sharing) <br> Yr2: <br> Recall \& use division facts for the 2,3, 5 and 10 multiplication tables. <br> Calculate statements within the multiplication tables and write them using the division and equals signs. [Show division of two numbers cannot be done in any order.] | Use concrete and real objects in real life contexts: <br> Children use sharing circles and part-whole and bar model mats to share counters, numicon and base ten equally: <br> Link division to multiplication by creating arrays and thinking about the number sentences that can be created. | Draw arrays and number lines (first modelled using Numicon and Number lines/ beads/ rekenreks/counters/objects) $\begin{aligned} & 15 \div 5=3 \\ & 00000 \\ & 00000 \\ & 00000 \end{aligned}$ <br> Draw part-whole and bar models: <br> Grouping on a number line: | In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. <br> Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division. <br> In Year 2, children are introduced to the division symbol: <br> 12 shared between 3 is 4 $12 \div 3=4$ |




## Craylands Addition and Subtraction Glossary:

Addend - A number to be added to another.
Aggregation - combining two or more quantities or measures to find a total.

Augmentation - increasing a quantity or measure by another quantity.

Commutative - numbers can be added in any order.

Complement - in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

Difference - the numerical difference between two numbers is found by comparing the quantity in each group.

Exchange - Change a number or expression for another of an equal value.

Minuend - A quantity or number from which another is subtracted.

Partitioning - Splitting a number into its component parts.

Reduction - Subtraction as take away.
Subitise - Instantly recognise the number of objects in a small group without needing to count.

Subtrahend - A number to be subtracted from another.

Sum - The result of an addition.

Total - The aggregate or the sum found by addition.

## Craylands Multiplication and Division Glossary:

Array - An ordered collection of counters, cubes or other item in rows and columns.

Commutative - Numbers can be multiplied in any order.

Dividend - In division, the number that is divided.

Divisor - In division, the number by which another is divided.

Exchange - Change a number or expression for another of an equal value.

Factor - A number that multiplies with another to make a product.

Multiplicand - In multiplication, a number to be multiplied by another.

Partitioning - Splitting a number into its component parts.

Product - The result of multiplying one number by another.

Quotient - The result of a division
Remainder - The amount left over after a division when the divisor is not a factor of the dividend.

Scaling - Enlarging or reducing a number by a given amount, called the scale factor

