St Peter \& St Paul
CofE Primary School

## Calculation Policy

|  | Date | Signed |
| :---: | :---: | :---: |
| Agreed by Staff: | June 2020 | C Harris E Burden K Thornton |
| Agreed by Governors: |  | Mrs N Ford Chair of Governors |
| Lead: | Emily Burden, Carla Harris \& Katie Thornton |  |
| Review date: | June 2021 |  |

We see it as our mission to grow the whole child - intellectually, emotionally, physically, socially and spiritually. To provide them, within a Christian environment, with every learning opportunity possible and to empower them to be the leaders of tomorrow.

## EYFS Calculation Policy

| Progression | Concrete | Pictorial | Abstract |
| :---: | :---: | :---: | :---: |
| DM 1: Count sets of objects/ sets of pictures and verbally compare e.g. more/ less.... |  |  |  |
| DM 2: Add one |  |  | $5+1=6$ |
| DM 3: Combine two groups into one group and count all of them to find the total. | $0+90=$ | $\cdots \bullet$ - $\bullet \bullet \bullet$ | $3+5=8$ |
| DM 4: Count on from the first number. |  | ${ }^{\bullet}$ | $5+3=8$ |
| Subtraction | Concrete | Pictorial | Abstract |
| DM 1: Take one away from a group. | - | - - - | 5-1 = 6 |
| DM 2: Take away a larger number and count group left. |  | $12-5=7$ | 12-5 = 7 |
| DM 3: Count back on a number line with numbers already on it. |  |  | $12-3=9$ <br>  |


| Multiplication | Concrete | Pictorial | Abstract |
| :---: | :---: | :---: | :---: |
| DM 1: Count practically in repeated groups/ patterns | $54083$ | $\begin{aligned} & 4 \times 2=8 \\ & 0 \bullet \theta \theta \theta \end{aligned}$ | $2+2+2+2=8$ |
| DM 2: Double |  |  | $2+2=4$ |
| DM 3: Count in 2's on a number |  |  | "2,4,6,8,10..." |
| Division |  |  |  |
| DM 1: Use objects then pictures or marks to share equally. | $\rightarrow\left\langle\theta \mid \theta^{2}\right\rangle$ | Sharing equally $\qquad$ how many do they each get? His 14 ( 16 | Share 8 sweets between 2 people. How many do they each get? |

## Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to', 'is the same as' and regrouping.

| Progression | Concrete | Pictoria | Abstract |
| :---: | :---: | :---: | :---: |
| 1.1 Combining two parts to make a whole. <br> https://www.youtube.com/watch?v= 5DgHrfUPVfg |  | $4+3=7$ <br> Four is a part, 3 is a part and the whole is | $4+3=7$ <br> Four is a part, 3 is a part and the whole is seven. |
| 1.2 Starting at the bigger number and counting on <br> https://www.youtube.com/watch?v=s BBQNVdXgMM | Counting on using number lines, cubes or Numicon. <br> 456 | A bar model which encourages the children to count on, rather than count all. | The abstract number line: 4 + 2 = 6 |
| 1.3 Regrouping to make 10 using ten frames or Numicon. <br> https://www.youtube.com/watch?v=m WPgqk06BTk |  | Children to draw the ten frame and counters/cubes. | Children to develop an understanding of equality e.g. $\begin{aligned} & 6+\square=11 \\ & 6+5=5+\square \\ & 6+5=\square+4 \end{aligned}$ |


| $\stackrel{N}{N}$ | 2.1 Adding three single digits. <br> https://www.youtube.com/watch?v=f_Gv <br> 07qomhE | Using Numicon or ten frames. | Using pictures of ten frames or number line. $7+3+4$ $\qquad$ | Use number bonds to make ten. $6+7+4=6+4+7=17$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 2.2 Use dienes to add two numbers. <br> ( 2 digit +1 digit and 2 digit +2 digit) <br> https://www.youtube.com/watch?v=e0 WrQKR V 8 | Continue to develop understanding of partitioning and place value. $41+8$ | Children to represent the dienes e.g. lines for tens and dot/crosses for ones. | $41+8$ <br> Add the ones: $1+8=9$ <br> Add the tens: $\mathbf{4 0 + 9 = 4 9}$ |
|  | 2.3 Use dienes to add two numbers with regrouping. (2 digit + 1 digit and digit + 2 digit) <br> https://www.youtube.com/watch?v=edfj 5ac1xzQ | $36+25$ <br> (regrouping in the ones) | $36+25$ | Expanded method: $36+25$ <br> Add the ones: $6+5=11$ <br> Add the tens: $\mathbf{3 0 + 2 0 = 5 0}$ $50+11=61$ |
| Year 3 | 3.1 Column method- regrouping (up to 3 digits). Using dienes. <br> https://www.youtube.com/watch?v=7q0 Qm17tP5w |  | $153+371=524$ | Introduce formal method: $\begin{array}{r} 153 \\ +371 \\ \hline \end{array}{ }^{1}$ |


|  | 3.2 Column method- regrouping (up to 3 digits). <br> Using place value counters. <br> https://www.youtube.com/watch?v=Uklr v-3KIgo | $243+368=611$ | $243+368=611$ | $\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 11 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
| $$ | 4.1 Column method regrouping (up to 4 digits). <br> Using place value counters. https://www.youtube.com/watch?v=_। nbaBeknc | $2162+1253$ | $2162+1253$1000 s 100 s 10 s 1 s <br> 00 0 00 00 <br> 0  00  <br> 0 00 00 00 <br>  0 0 0 | $\frac{+1253}{3515}^{1}$ |
|  | 5.1 Column method- regrouping with more than 4 digits | See Year 4 if required. | See Year 4 if required. | $\begin{array}{r} 1720 \mathrm{~cm} \\ 750 \mathrm{~cm} \\ +1500 \mathrm{~cm} \\ \hline \frac{3970 \mathrm{~cm}}{1} \end{array}$ |



| 6 $\stackrel{2}{C}$ $\stackrel{c}{c}$ | 6. 1 Column methodregrouping with more than 4 digits | See Year 4 if required. | See Year 4 if required. | $\begin{array}{r} 1720 \mathrm{~cm} \\ 750 \mathrm{~cm} \\ +1500 \mathrm{~cm} \\ \hline \frac{3970 \mathrm{~cm}}{1} \end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 6.2 Column method - decimals (up to 2 d.p.). <br> Use place value counters. | See Year 5 if required. | See Year 5 if required. | $\begin{array}{r} £ 1.36 \\ +£ 2.37 \\ \hline \frac{£ 3.73}{1} \end{array}$ |

## Conceptual variation; different ways to ask children to solve 21 + 34

Visual representations
Part-part-whole diagrams and bar models.


| $?$ |  |
| :--- | :--- |
| 21 |  |

Word problems
In year 3, there are 21 children and in year 4, there are 34 children. How many children in total?

Calculate the sum of twenty-one and thirty-four.


## Subtraction

Key language: take away, less than, difference, subtract, minus, fewer, decrease.

| Progression | Concrete | Abstract |
| :---: | :---: | :---: | :---: |



| 1.7 Make 10 using the ten |
| :--- | :--- | :--- | :--- | :--- |
| frame |
| https://www.youtube.com/watch? |$\quad$| Making 10 using a ten frame. 14-5 |
| :--- | | Children to present the ten frame pictorially |
| :--- |
| and discuss what they did to make ten. |$\quad$| Children to show how they can make ten by |
| :--- |
| partitioning the smaller number. |


|  | v=gEgyUQXbbKA | 0 -4 <br> $\|$ ${ }^{-1}$ <br>   -1 |  |  $\begin{aligned} & 14-4=10 \\ & 10-1=9 \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 2.4 Counting back using a number line. https://www.youtube.com/watch? <br> $\underline{v=r G Z G c w 5 V c 7 Q}$ | 15-7 |  | $15-7=8$ |
|  | 2.5 Use dienes to subtract numbers up to 2 digits (without regrouping). <br> https://www.youtube.com/watch? $\qquad$ <br> $v=E 4 o t y i f o Q e g$ | Column method using dienes. 48 7 | Children to represent dienes pictorially. | $48-7=41$ |
|  | 2.6 Use dienes to subtract numbers up to 2 digits (with regrouping). <br> https://www.youtube.com/watch? <br> v=Dyj7hvibImU | Column method using dienes. 41 $-26$ | $41-26$ | $41-26=15$ |


| 3.3 Column method with <br> regrouping- with place <br> value counters and dienes | Column method using place <br> value counters. 234-88 | $234-88$ | Formal column method. |
| :--- | :--- | :--- | :--- | :--- |



|  |  |  | emersteme |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |
| \% |  |  |  | $\begin{aligned} 4 \\ \hline \end{aligned}$ |


| 6.4 Column method for <br> decimals up to 2 decimal <br> places with <br> place value counters | See Year 5 if required. | See Year 5 if required. Year 5 if required. | See |  |
| :---: | :---: | :---: | :--- | :--- |

Conceptual variation; different ways to ask children to solve 391-186


## Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups, factors, regroup.


|  | 1.10 Repeated addition. <br> https://www.youtube.com/watch? $\mathrm{v}=$ EoElxmyRf9M | Repeated addition <br> $3 \times 4$ <br> $4+4+4$ <br> There are 3 equal groups, with 4 in each qroup. |  | $\begin{aligned} & 3 \times 4=12 \\ & 4+4+4=12 \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 1.11 Arrays <br> https://www.youtube.com/wateh? $\mathrm{v=f3p4} \text { _5ast-4 }$ | Putting <br> objectsinto arrays. <br> 2 lots of 5 <br> 5 lots of $2 \mathbf{2}$ $\times 5=5 \times 2$ | Children describe arrays in different ways. 2 groups of 5 <br> 5 groups of 2 | Children to be able to use an array to write a range of calculations e.g. $5 \times 2=10$ $2 \times 5=10$ |
| $$ | 2.7 Number line to show repeated addition https://www.youtube.com/watch? $\mathrm{v}=$ RsBIrg1uigc | Number lines to show repeated groups. E.g. $3 \times 4$ $\square$ <br> Cuisenaire rods and Numicon can be used too. | Represent this pictorially alongside a number line | $\left\lvert\, \begin{aligned} & 4+4+4=12 \\ & 3 \times 4=12 \end{aligned}\right.$ |


| 2.8 Arrays - showing commutative multiplication <br> https://www.youtube.com/wat ch?v=t2q9ePsDwDg | Use arrays to illustrate commutativity counters and pegs can be used. $2 \times 5$ $=5 \times 2$ <br> 2 lots of 5 <br> 5 lots of 2 | Children to represent the arrays pictorially. | Children to be able to use an array to write a range of calculations e.g. $\left\lvert\, \begin{aligned} & 10=2 \times 5 \\ & 5 \times 2=10 \\ & 2+2+2+2+2=10 \\ & 10=5+5 \end{aligned}\right.$ |
| :---: | :---: | :---: | :---: |
| 3.5 Multiplication by partitioning 2d $\times 1 \mathrm{~d}$ using dienes https://www.youtube.com/watch? $\mathrm{v}=\mathrm{uY7w} \mathbf{4 8 W V K 6 k}$ | Partition to multiply using dienes of Numicon. | $4 \times 15$ <br> A number line should also be used | Children to be encouraged to show the steps they have taken. $\begin{array}{r} 4 \times 15 \\ 105 \\ 4 \times 5=20 \\ 4 \times 10=\underline{40} \\ \underline{60} \end{array}$ |
| 3.6 Short multiplication <br> ( 2 digit X 1 digit) <br> https://www.youtube.com/wateh? <br> v=vhH_-xViOfQ | Short multiplication method. Use counters or dienes. $3 \times 23$ | $10 s$ $1 s$ <br> 00 000 <br> 00 000 <br> 00 000 <br> $3 \times 23$ 6 | Children to be encouraged to show the steps they have taken. $\begin{array}{rr} 3 \times 3=9 \\ 3 \times 20=60 \\ \underline{69} & 23 \\ \hline \quad 3 \\ \hline \end{array}$ |



| $\begin{aligned} & 10 \\ & \frac{2}{10} \\ & 0 \\ & \hline 1 \end{aligned}$ | 5.5 Short multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit X 1 digit) https://www.youtube.com/watch? $\mathrm{v}=3$ YScfFIbWsQ | See Year 4 if required | See Year 4 if required | $\begin{array}{r} 2741 \\ \times \quad 6 \\ \hline 16446 \\ \hline 42 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 5.6 Long multiplication <br> Abstract only but might need a repeat of year 4 first <br> (up to $\mathbf{4}$ digit $\mathbf{X} 2$ digits) | See year 4 if required. | See year 4 if required. | $\begin{array}{r} 132 \\ \times \quad 56 \\ \hline 792 \\ \hline 601 \\ 6600 \\ \hline 1392 \end{array}(132 \times 50)$ |
| $\begin{aligned} & 6 \\ & \stackrel{1}{10} \\ & \stackrel{1}{7} \end{aligned}$ | 6.5 Long multiplication Abstract method (up to 4 digits by a 2 digit number) https://www.youtube.com/watch? $\mathrm{v}=9 \mathrm{gHHTOL} 5514$ | See year 4 if required. | See year 4 if required. | $\begin{array}{r} 132 \\ \times \quad 56 \\ \hline 792 \\ \hline 6600 \\ \hline 10 \\ \hline 7392 \end{array}(132 \times 6)$ |

## Conceptual variation; different ways to ask children to solve $6 \times 23$



## Division

Key language: share, group, groups of, lots of, regroup divide, divided by, remainder divisor, dividend.

|  | Progression | Concrete | Pictorial | Abstract |
| :---: | :--- | :--- | :--- | :--- |
|  | 1.12 Division by sharing <br> objects into groups. <br> https://www.youtube.com/watch? | Sharing using a range of objects. <br> $6 \div 2$ | Represent the sharing pictorially. | $6 \div \mathbf{2 = 3}$ |



| $$ | $\underline{\text { v }=9 a i c Y L Z i L 2 A ~}$ |  | $18 \div 6=3$ |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 2.10 Division within arrayslinking to multiplication. <br> (Sharing and grouping) <br> https://www.youtube.com/watch? v=95Y4UCivcww | 15 shared between 3.15 in groups of 5. |  | $\left\lvert\, \begin{aligned} & 15 \div 5=3 \\ & 15 \div 3=5 \end{aligned}\right.$ |
|  | 2.11 Division as counting up https://www.youtube.com/watch? <br> v=2c3FwEcCpyc | How many groups of 2 in 6? Use a number line or Cuisenaire rods on a ruler. $6 \div 2$ <br> 3 groups of 2 | Children to represent division by counting up | $6 \div 2=3$ |


| 3.8 To divide a two digit number by a one digit | Cuisenaire rods, above a ruler can also be used. $13 \div 4$ | Children to represent the lollipop ticks pictorially. | $13 \div 4=3$ remainder 1 |
| :---: | :---: | :---: | :---: |


| $\begin{aligned} & \text { m } \\ & \stackrel{4}{0} \\ & \stackrel{1}{3} \end{aligned}$ | number with and without remainders. $\qquad$ <br> $\mathrm{v}=\mathrm{dOmB91prpwQ}$ | Use of lollipop sticks to form wholessquares are made because we are dividing by 4. <br> There are 3 whole squares, with 1 remainder. <br> Use of numicon. How many groups of 3 in $20 ? 20 \div$ <br> 3 <br>  | There are 3 whole squares, with 1 I | Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. <br> '3 groups of 4, with 1 left over' $13 \div 4=3 r 1$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 3.9 Short Division <br> To divide a two digit number by a one digit number with regrouping of tens and ones (no remainders) https://www.youtube.com/watch? | Short division using place value counters and dienes to group. $42 \div 3=14$ | Children to represent the place val counters/dienes pictorially. | $\begin{gathered} 14 \\ 3 \sqrt[4^{\prime 2}]{12} \\ 42 \div 3=14 \end{gathered}$ |


| 4.5 Short division | Short division using place value <br> To divide a 3 digit number <br> by a 1 digit number with <br> regrouping in hundreds, <br> tens and ones <br> https://www.youtube.com/watch? | Represent the place value counters pictorially. | Children progress to short tion using the <br> division scaffold. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |


|  |  | $\frac{1005}{\circ 85}$ |  | $\begin{array}{r} 123 \\ 5 \\ 66^{\prime 2} 5 \end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | med | 4) $\frac{0658}{2^{\prime} 63^{\prime 2}}$ |
|  |  |  |  | $\frac{0.16}{5 \longdiv { 0 . 8 ^ { \prime \prime } 0 }}$ |



## Conceptual variation; different ways to ask children to solve ......



Word problems:
I have $£ 615$ and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

Different forms of equation:
Concrete representations: What is the calculation? What is the answer?

| 100s | 10s | 1s |
| :---: | :---: | :---: |
| - ${ }^{\circ}$ |  | 00000 |
| ${ }^{\circ}{ }^{\circ}$ | poceo | $00000$ |

## $5 \longdiv { 6 1 5 }$

$615 \div 5=$
$=615 \div 5$

| Calculation policy to be reviewed in line with policy <br> schedule: |  |
| :---: | :---: |
| Written by: C Harris, E Burden, K Thornton |  |
| Reviewed: |  |
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