

With friendship, trust and kindness we fly!

# Swallowtail Federation Calculation Policy 

This policy will be reviewed in full by the Governing Body every 3 years. This policy was last reviewed and agreed by the Governing Body May 2023. It is due for review on May 2026.

Signature
Executive Headteacher

## Rationale for our Calculation Policy

Our calculation policy is written progressively from where pupils start, to where it is expected that pupils finish in preparation for Key Stage 3. Pupils move onto the next stage of learning when they have developed a conceptual understanding and teachers feel they are ready for the next stage in learning.

Our calculation policy is underpinned by our distinctly Christian vision. Through its clear progression which enables calculations to be carried out efficiently, fluently and accurately with understanding, pupils are able to 'fly' reaching their true potential.

## Manipulatives at Swallowtail

The diagram below shows the main indoor manipulatives used within all classes within the Swallowtail federation. Within classes these can be seen either in baskets, trugs and are readily available in every mathematics lesson.


In addition to indoor resources, as a federation we value outdoor learning opportunities and therefore the diagram below illustrates some of the many outdoor manipulatives our pupils use.


When teaching specific topics such as measure and fractions, specialised manipulatives will be used in addition to those above such as clocks, tape measures, scales and fraction walls.

As a federation, we teach mathematics through the concrete, pictorial and abstract approach (CPA) and all staff plan for opportunities to use manipulatives wherever possible. Within pupils' work, evidence of using manipulatives can be seen in photographs and underneath the learning objective, where pupils indicate what they have used during the lesson.

## Mathematical Vocabulary

Accurate mathematical vocabulary is essential. Staff have high expectations of pupils to use correct mathematical language and regularly teach mathematical vocabulary as part of daily mathematics lessons. All staff regularly refer to their copy of the NCETM Mathematics Glossary to aid vocabulary teaching.

| Add | Subtract | Multiply | Divide | Equals | Unequal |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Plus | Minus | Times | Share | Is the same as | Is not the same value as |
| Make | Less than | Product of | Group | Equivalent | Not equivalent |
| And | Count back | Lots of | Divisor | Same value as | Unbalanced |
| Sum | Fewer than | Groups of | Factor | Balance |  |
| Total | Take away | Multiply by | Remainder |  |  |
| Count on | Difference between | Multiple of | Equal groups of |  |  |
| Most | Least | Repeated addition | Divided by |  |  |
| Put together |  | Array | Divided into |  |  |
| Altogether |  |  | Shared equally |  |  |
| Combine |  |  | Repeated subtraction |  |  |
| Increase |  |  |  |  |  |
| More than Total |  |  |  |  |  |

## Avoiding misconceptions

Below are examples of terminology to avoid or be mindful of using to reduce children's mathematical misconceptions:

- Sum (for anything other than addition calculations)
- Stealing/borrowing (using exchange would be better)
- If using equals ensure children understand that they are talking about a value that is the same rather than 'the answer'.
- Calculation and equation are more acceptable terms to use than number sentence.


## Addition

| Concrete | Pictorial | Abstract |
| :---: | :---: | :---: |
| Combine two parts to make a whole $\square$ | $0000+000=0000$ 000 |  |
| Counting on using number tracks (starting with the biggest number) <br> Beadstring | $4+3=7$ <br> Number track using fingers or counters to add on. |  |



| Continuation encouraging pictorial representation as a number line |  | $\begin{aligned} & 368+200=568 \\ & 568+40=608 \\ & 608+3=611 \end{aligned}$ |
| :---: | :---: | :---: |
| Continuing to add larger numbers includes decimals. | $321.2+122.1=$     <br> How Tent One tenths   <br> 000 00 0 00  <br> 0 00 00 0  <br> 4 4 3 3  | $\begin{aligned} & 623 \\ & +69 \\ & \hline 23 \end{aligned}$ |
|  |  | Once conceptual understanding has been secured, pupils will complete calculations using the compact formal method. |


|  |  |  $23 \cdot 361$ <br> Insert zeros for  <br> place holders. $9 \cdot 080$$\quad$$9 \cdot 770$$\quad$$1 \cdot 300$ <br> $23 \cdot 511$ |
| :---: | :---: | :---: |
| Recognising simple fractions of shapes | Pictorial representation | If I split my bar into two equal parts, what does each part show? $1 / 2$ |
| Fractions of amounts $1 / 4$ of $16=$ |  | $1 / 4$ of $16=4$ |



## Subtraction

| Concrete | Pictorial | Abstract |
| :---: | :---: | :---: |
| Physically take objects away from a group. |  | $\begin{aligned} & 5-3=2 \\ & 20-8=12 \end{aligned}$ |
| Moving objects away from a group counting backwards |  | Starting at 13 , count back 4 . What number are you at? |
| Find the difference $10-7$ |  | Sophie has 12 sweets and her sister has 5 . How many more does Sophie have than her sister. $3=5-2$ $2=5-3$ <br> 5-2=3 <br> 5-3=2 |


| 'Seven is 3 more than four' 4 |  |  |
| :---: | :---: | :---: |
| Use number bonds, number facts, part whole model. <br> Link to addition. Use PPW model to model the inverse. If 10 is the whole and 6 is one of the arts, what $s$ the other part? $10-6=4$ | Use pictorial representations to show the part. | Move to using numbers within the part whole model. |
| Make 10 $14-5=$ <br> Make 14 on a tens frame. Subtract 4 to make 10 then subtract the last 1. |  <br> Jump back 3 first, then another 4 . Use ten as the stopping point. | $16-8$ <br> How many do we take off first to get to 10 ? How many left to take off? |



| Column subtraction without regrouping Base 10 or numicon $\\|\\| \mid \overbrace{\oplus}$ | Children draw | $\begin{gathered} 47-24=23 \\ -40+7 \\ -\frac{20+4}{20+3} \end{gathered}$ <br> Once ready and understand conceptually $\begin{array}{r} 47 \\ -24 \\ \hline 23 \\ \hline \end{array}$ |
| :---: | :---: | :---: |
| Column subtraction with regrouping <br> Begin with base 10 or Numicon. Move to PV counters, modelling the exchange of a ten into ten ones. Use the phrase 'take and make' for exchange. $35-19=$ | Children may draw base ten or PV counters and cross off. |  <br> Begin by partitioning into pv columns. <br> Then move to formal written method $\begin{array}{cccc} 728 & -582=146 \\ { }^{\prime \prime} & & 4 & u \\ { }^{7} & \prime 2 & 8 \\ 5 & 8 & 2 \\ \hline 1 & 4 & 6 \\ \hline \end{array}$ |



|  |  |  |  |
| :--- | :--- | :--- | :--- |

Multiplication

| Concrete | Pictorial | Abstract |
| :---: | :---: | :---: |
| counting in groups of/ repeated addition/ skip counting |  | Count in multiples of a number aloud. <br> Write sequences with multiples of numbers. $0,2,4,6,8,10$ $\begin{aligned} & 0,3,6,9,12,15 \\ & 0,5,10,15,20,25,30 \end{aligned}$ $4 \times 3=$ |
| multiplication is commutative |  | Use an array to support writing repeated addition. $\begin{aligned} & \quad 00000 \\ & 00000 \\ & 00000 \\ & 5+5+5=15 \\ & 3+3+3+3+3=15 \\ & 5 \times 3=15 \\ & 3 \times 5=15 \\ & 15=5 \times 3 \\ & 15=3 \times 5 \end{aligned}$ |


| using the inverse |  | $2 \times 4=8$ <br> $4 \times 2=8$ <br> 8 | $8 \div 2=4$ <br> 8 |
| :--- | :--- | :--- | :--- |




## Division







