St George's Primary School

Calculations Policy

<u>Aims:</u>
At St George's Primary School we believe that the ability to calculate effectively using the four operations of addition, subtraction, multiplication and division is an important life skill. We follow the National Curriculum for expectations for calculations in Years 1 to 6.
This policy is written to achieve the following:

- To ensure that there is a **consistent** approach to the teaching of calculation across the school.
- To ensure that there is **progression** in the teaching of calculation from Foundation Stage to the end of Key Stage Two.
- To ensure that children develop a **range of appropriate calculation strategies.**

<u>Resources:</u>
We use a wide range of resources to teach calculation across the school. Formal written calculation methods are introduced in Key Stage 2.

Teachers have access to a wide range of apparatus in order to teach calculation, including base 10, bead strings, number lines and hundred squares. These help to develop the models and images that are necessary when developing calculation skills.

<u>Monitoring and Review:</u>
This policy will be monitored by the Senior Leadership Team. This will include observation of teaching and workbook scrutiny to ensure that calculation skills are being taught effectively and consistently across the school.

Written by Miss H. Rhodes (Maths Leader)   Date: 24/02/2020

Mental Calculation and Jotting Strategies

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They make use of **objects**, **bead strings, number tracks, numberlines and Base 10** to support addition and subtraction. The year group reflects the age when strategies are introduced for children working at expectation but they will still be built on and developed in subsequent years with appropriate numbers and values. All year groups use estimation to judge the reasonableness of an answer.

Addition and Subtraction

<u>Early Years</u>
- Counting on and back from different starting points.
- Subitising.
- Putting the largest number first to add.

<u>Year 1</u>
- Partitioning when adding tens or ones to 2 digit numbers
- Adjusting- Add/ Subtract 10 first then adjust when adding/ subtracting 9 or 11
- Counting on to find a small difference, eg 19 - 18

<u>Year 2</u>
- Partitioning into tens and ones to add/subtract 2 digit numbers
- Adjusting- Add/ Subtract 100 first then adjust when adding/ subtracting 99

<u>Year 3</u>
- Make 9, Make 10 when giving complements of 100
- Empty timelines to calculate the difference in times

<u>Year 4</u>
- Subtraction as a difference, eg 2000-1278 = 1999 – 1277 before using column method

Multiplication

<u>Early Years</u>
- Relate doubling to addition

<u>Year 1</u>
- Counting in multiples as precursor to learning times tables
- Partitioning linked to arrays, eg $12 \times 5 = (10 \times 5) + (2 \times 5)$

Year 2
- Choosing appropriate multiple to count in, eg 10 x 13 – count in 10s not 13s
- Repeated addition to show multiplication facts, which could be represented on a numberline.

Year 3
- Multiplying by 10 by moving digits
- Use partitioning to multiply by numbers between 11 and 19, eg 14 x 15 = (14 x 10) + (14 x 5)
- Smile multiplication by using known facts, eg 30 x 4 = 3 x 4 x 10

Year 4
- Adjusting for known facts, eg 324 x 9 = (324 x 10) – (324 x 1)
- Using factor pairs, eg 32 x 14 = 32 x 2 x 7

Year 6
- Using fraction/percentage/decimal equivalents, eg 324 x 0.25 = ¼ of 324 = 324 ÷ 4

Division

Early Years
- The children use **objects** to understand the process of halving in practical contexts.

Year 2
- Division facts can be represented as repeated subtraction on a numberline.

Year 3
- Dividing by 10 by moving digits

Year 4
- Using factor pairs, 120 ÷ 15 = 120 ÷ 5 ÷ 3
- Using known facts, eg 630 ÷ 70 = 630 ÷ 7 ÷ 10

Year 5
- Adjusting both numbers, eg 630 ÷ 70 = 63 ÷ 7
- Partitioning by spotting known facts, eg 644 ÷ 7 = (630 ÷ 7) + (14 ÷ 7)

Year 6
- Using fraction/percentage/decimal equivalents, eg 324 ÷ 0.25 = 324 ÷ ¼ = 324 x 4
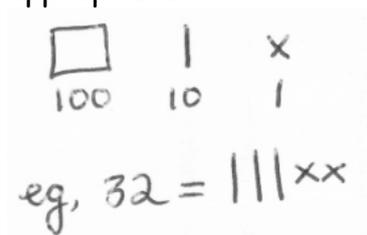- Using given facts, eg If 325 ÷ 25 = 13, what is 325 ÷ 50?

Formal Written Calculation Strategies

Addition and Subtraction

Early Years

There is no expectation for recording of formal calculations at this stage but children are introduced to addition, subtraction and equals symbols.
The school recording system for Hundreds, tens and ones is introduced, when appropriate:
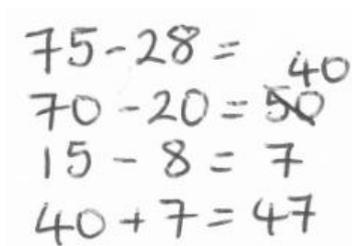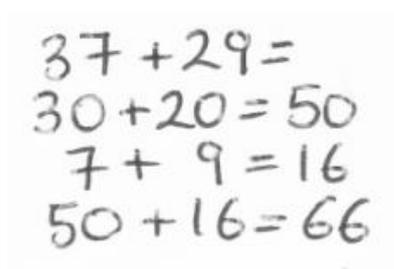

Year 1
- Children read, write and interpret mathematical statements using addition (+), subtraction (-) and equals (=) signs up to 20.

Year 2
- Children use their understanding of partitioning 2 digit numbers to add and subtract numbers:

Key Stage 2

Throughout Key Stage 2, **Base 10** continues to be used to MODEL AND SUPPORT the development of addition and subtraction into formal written methods. BASE 10 MUST BE USED TO REINFORCE THE PLACE VALUE AS THE WRITTEN METHOD IS LEARNT.

789 + 642 becomes

```
      7   8   9
  +   6   4   2
  _____
  1   4   3   1
      1   1
```

Answer: 1431

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

Year 3
- The above methods are used for adding and subtracting up to and including 3 digit numbers e.g. 714-68.

Year 4
- The above methods are used for adding and subtracting up to and including 4 digit numbers e.g. 2143-658.

Year 5
- The above methods are used for adding and subtracting up to and including 5 digit numbers e.g. 21443-6158 and decimals of equal length.

Year 6
- The above methods are used for adding and subtracting up to and including 6 digit numbers e.g. 214043-61658 and decimals of different lengths.

Multiplication and Division

Year 1
- Children are introduced to the symbols for multiplication and division.

Year 2
- Children read, write and interpret mathematical statements using multiplication (x), division (÷) and equals (=) signs.

Year 3
- Children are introduced to the formal method of short multiplication for multiplying a 2 digit number by a single digit number:

24×6 becomes

```
      2   4
  ×       6
  ─────────
  1   4   4
      2
```

Answer: 144

They are introduced to the formal method of short division for dividing a 2 digit number by a single digit number.

$98 \div 7$ becomes

```
      1   4
    ┌──────
    │   2
  7 │ 9   8
```

Answer: 14

Year 4
- The above methods are used to multiply and divide a 3 digit number by a single digit. **Answers should include remainders to interpret according to the context.**

342×7 becomes

```
    3   4   2
  ×         7
  ───────────
  2   3   9   4
      2   1
```

Answer: 2394

$432 \div 5$ becomes

```
        8   6   r 2
      ┌──────────
      │       3
  5   │ 4   3   2
```

Answer: 86 remainder 2

Year 5

- Short multiplication to multiply 4 digit numbers by a single digit and they begin to learn long multiplication to multiply numbers up to 4 digits by a 2 digit number:

2741 × 6 becomes

```
      2  7  4  1
×              6
  1  6  4  4  6
        4  2
```

Answer: 16 446

124 × 26 becomes

```
              2
      1  2  4
×        2  6
      7  4  4
   2  4  8  0
   3  2  2  4
      1  1
```

Answer: 3224

- Children divide numbers up to 4 digits by a single digit number using short division and interpret remainders for the context.

Year 6

- Consolidate using long multiplication when multiplying by 2 digit numbers.

- Children divide numbers up to 4 digits by a 2 digit number using long division and interpret remainders as appropriate, and continue to consolidate their use of short division.

432 ÷ 15 becomes

```
            2  8  r 12
   1  5 | 4  3  2
          3  0  0
          1  3  2
          1  2  0
             1  2
```

Answer: 28 remainder 12

432 ÷ 15 becomes

```
            2  8
   1  5 | 4  3  2
          3  0  0      15×20
          1  3  2
          1  2  0      15×8
             1  2
```

$$\frac{12}{15} = \frac{4}{5}$$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

```
            2  8 · 8
   1  5 | 4  3  2 · 0
          3  0  ↓
          1  3  2
          1  2  0  ↓
             1  2  0
             1  2  0
                   0
```

Answer: 28·8