Gillibrand Primary School

Maths Calculation Policy - Division

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Aims

We believe that all children require a solid understanding of place value and the number system, which, together with the knowledge and recall of number facts and mental strategies, act as the foundation for mathematical development.

Calculation strategy development is vital to our teaching and learning strategy, being viewed as the tools for our children's future successes in applied application.

In order to ensure a deep understanding of number and calculation, we use the 'concrete, pictorial, abstract' approach to ensure all pupils develop a deep understanding of maths that is essential for developing mastery in mathematics. As such, our calculation policy is based on this approach whilst ensuring progression and continuity in mathematical calculation across school.

The Concrete Step:

The concrete stage is the physical doing stage. During this stage pupils use concrete objects. In this way bringing mathematical learning to life

The Pictorial Step:

The pictorial stage is the 'seeing' stage. Visual representations of concrete objects are used to support leaning. This supports children making a mental connection between the physical object and the pictures, diagrams or models.

The Abstract Step

Abstract is the 'symbolic stage', where children use only numbers, notation and mathematical symbols to indicate addition, subtraction and multiplication.

Reasoning and Problem Solving:

Once children are fluent in the calculation strategy for their year group, we deepen and embed understanding through providing children with a range of reasoning and problem solving skills that allow the children to show their full understanding in a range of different context.


Although our policy is set out based on The National Curriculum year group expectations, children work through the calculation policy systematically. Some children may therefore be working below year group expectation and should be taught the method appropriate for their individual stage in learning.

Calculation Policy: Division

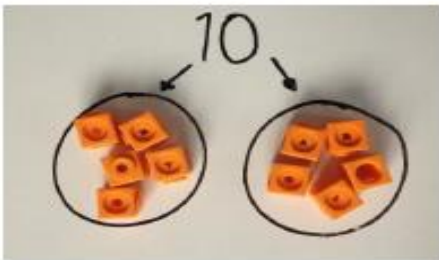## Key Vocabulary: share, divide, remainder, divisor, factor, quotient

EYFS

Children will understand equal groups and share items out in play and problem solving.
They will count in 2s and 10s and later in 5s.
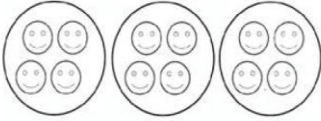
Year 1 - Solve simple one-step ÷ problems using objects, pictures and arrays with my teacher's help.

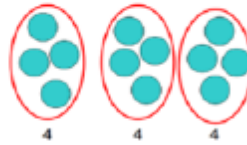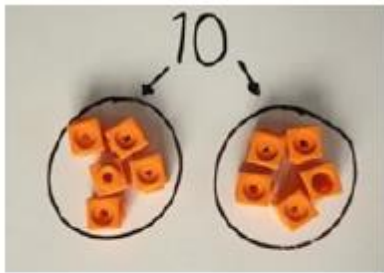| Concrete	Pictorial	Abstract
  I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities. 8 shared between 2 is 4 Sharing: 12 shared between 3 is 4	12 shared between 3 is 4

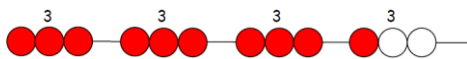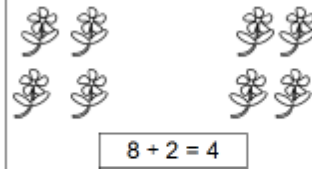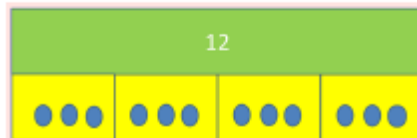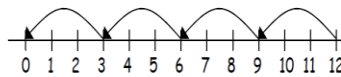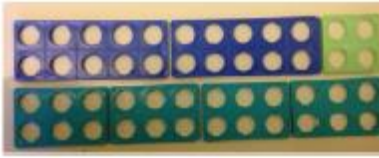| Year 2 - Solve division problems, including problems in context, using apparatus if required.		
Concrete	**Pictorial**	**Abstract**
Children will develop their understanding of division and use jottings to support calculation. They will share equally using 6 sweets shared between 2 people, how many do they each get? They will use counters, cubes or any other physical apparatus to share. I have 10 cubes, can you share them equally in 2 groups? Children will also use and explore the method of grouping using the physical apparatus as above or a bead string. Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	Children use pictures or shapes to share quantities. $8 \div 2 = 4$ Children use bar modelling to show and support understanding. $12 \div 4 = 3$ Children use a number line to look at repeated addition and 'groups of' $12 \div 3 = 4$ 	$12 \div 3 = 4$

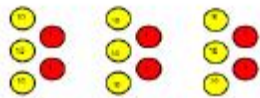| Concrete	Pictorial	Abstract
Use cubes, counters, objects or place value counters to aid understanding.	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.	Find the inverse of multiplication and di sentences by creating eight linking num sentences.

Concrete

Use cubes, counters, objects or place value counters to aid understanding.

24 divided into groups of 6 = 4

96 ÷ 3 = 32
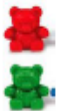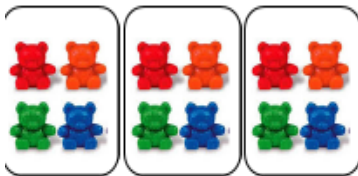
Link division to multiplication by creating an array and thinking about the number sentences that can be created.

Eg 15 ÷ 3 = 5   5 x 3 = 15

15 ÷ 5 = 3   3 x 5 = 15

14 ÷ 3 =

Divide objects between groups and see how much is left over
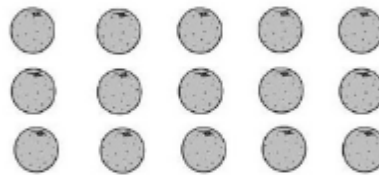
Pictorial

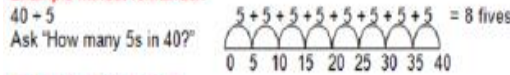Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.

0   4   8   12 13

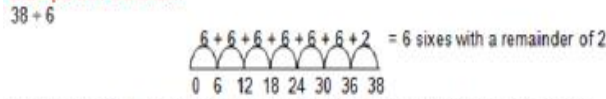Draw dots and group them to divide an amount and clearly show a remainder.

remainder 2

Draw an array and use lines to split the array into groups to make multiplication and division sentences
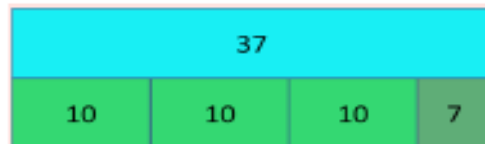
Example without remainder:
40 ÷ 5
Ask "How many 5s in 40?"

5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 fives

0 5 10 15 20 25 30 35 40

Example with remainder:
38 ÷ 6

6 + 6 + 6 + 6 + 6 + 2 = 6 sixes with a remainder of 2

0 6 12 18 24 30 36 38

For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.

Use bar models to show division with remainders.

37			
10	10	10	7

Abstract

Find the inverse of multiplication and di sentences by creating eight linking num sentences.

$7 \times 4 = 28$

$4 \times 7 = 28$

$28 \div 7 = 4$

$28 \div 4 = 7$

$28 = 7 \times 4$

$28 = 4 \times 7$

$4 = 28 \div 7$

$7 = 28 \div 4$

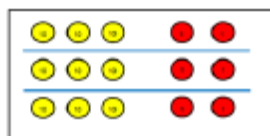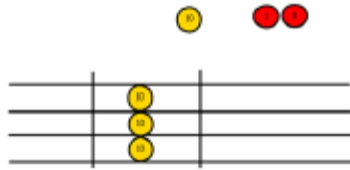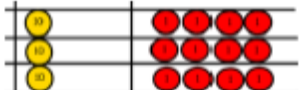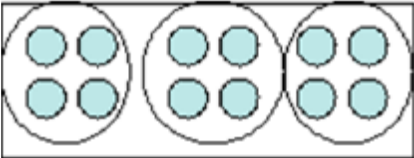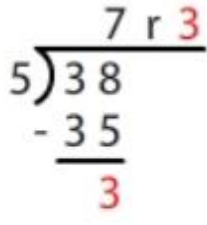How many groups of 6 in 24?

$24 \div 6 = 4$

Complete written divisions and show the remainder using r.

$29 \div 8 = 3$ REMAINDER 5

dividend   divisor   quotient   remainder

Year 4 - Divide a two digit number by a one digit number using an efficient written method.

Concrete	Pictorial	Abstract

Concrete

$96 \div 3$

Tens	Units
3	2

Use place value counters to divide using the bus stop method alongside

Calculations
$42 \div 3$

$42 \div 3 =$

Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.

We exchange this ten for ten ones and then share the ones equally among the groups.

We look how much in 1 group so the answer is 14.

Pictorial

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.

Encourage them to move towards counting in multiples to divide more efficiently.

Abstract

$$\begin{array}{r} 7 \ r \ 3 \\ 5\overline{)38} \\ -35 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 19 \ r \ 2 \\ 3\overline{)59} \\ -3 \downarrow \\ \hline 29 \\ 27 \\ \hline 2 \end{array}$$

Year 5 - Divide numbers up to 4 digits by a 1 digit number using short division written method and interpret remainder appropriately for the context		
Concrete	**Pictorial**	**Abstract**
Once the children are confident at dividing a 2-digit number by a 1-digit number and have been given the precious concrete and pictorial experiences most children will not need the concrete and pictorial approach.		Begin with divisions that divide equally with no remainder. 2 1 8 3 4	8 7 2 Move onto divisions with a remainder. 8 6 r 2 3 5	4 3 2 Finally move into decimal places to divide the total accurately. 0 6 6 3 r 5 8) 5³3 ⁵0²9

Year 6 - Use written division methods in cases where the answer has up to 2 decimal places. Divide numbers up to 4 digits by a 2-digit whole number using formal written method of short division where appropriate, and interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context.		
Concrete	**Pictorial**	**Abstract**
Once the children are confident at dividing a 2-digit number by a 1-digit number and have been given the precious concrete and pictorial experiences most children will not need the concrete and pictorial approach.		1 4 . 6 16 21 3 5	5 1 1 . 0 h t o 0 4 1 R1 4) 1 6 5 4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160). 4 goes into 16 four times. 4 goes into 5 once, leaving a remainder of 1. th h t o 0 4 0 0 R7 8) 3 2 0 7 8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200). 8 goes into 32 four times (3,200 ÷ 8 = 400) 8 goes into 0 zero times (tens). 8 goes into 7 zero times, and leaves a remainder of 7.

Remainders should also be written as decimals.

```
        h t o
        0 6 1
  4 ) 2 4 7
        - 4
          3
```

When dividing the ones, 4 goes into 7 one time. Multiply 1 × 4 = 4, write that four under the 7, and subtract. This finds us the remainder of 3.

Check: 4 × 61 + 3 = 247

```
      th h t o
        0 4 0 2
  4 ) 1 6 0 9
          - 8
            1
```

When dividing the ones, 4 goes into 9 two times. Multiply 2 × 4 = 8, write that eight under the 9, and subtract. This finds us the remainder of 1.

Check: 4 × 402 + 1 = 1,609

```
15 | 8  6  4  0
```
15 into 8 doesn't go, so look at the next digit.

```
              5
15 | 8   6   4   0
   - 7   5
     1   1
```
15 goes into 86 five times, so put a 5 above the 6.
15 x 5 = 75

Take that 75 away from the 86 to get your remainder.
86 – 75 = 11

```
              5   7
15 | 8   6   4   0
     7   5
     1   1   4
   - 1   0   5
                 9
```
Next, carry the 4 down to make 114.

15 goes into 114 seven times, so put a 7 above the 4.
15 x 7 = 105

Take 105 from the 114 to get your remainder
114 – 105 = 9

```
              5   7   6
15 | 8   6   4   0
     7   5
     1   1   4
   - 1   0   5
                 9   0
```
Carry the 0 down to make 90

15 goes into 90 exactly 6 times, so put a 6 above the 0

15 x 6 = 90

8,640 ÷ 15 = 576