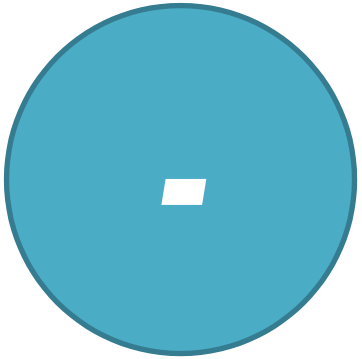
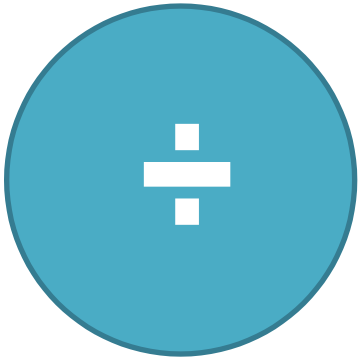
Mathematics Written Calculation Policy





Created in Partnership with

Falmouth Primary School

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King Charles C of E Primary School

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YEAR 1 — ADDITION

Step 1	Step 2	Step 3	End of year expectation
* I am beginning to know that addition is the combining of two groups of objects * I can recall addition facts to 10 * I can add two 1-digit numbers * I can record my work using + and =	* I know that addition is the total of two sets * I can use addition facts to 10 to determine related subtraction facts * I am beginning to work out the value of a missing number	* I can use the vocabulary related to addition * I can recall addition facts to 20 * I am beginning to add 1-digit and 2-digit numbers to 20, including zero * I can work out the value of a missing number, e.g. 30 - ? = 24	* **I can read, write and interpret mathematical statements involving addition (+) and equals (=) signs** * **I can represent and use number bonds within 20** * **I can add 1-digit and 2-digit numbers to 20, including zero** * **I can solve missing number problems such as 7 = ? – 9**

Count reliably up to 20 objects

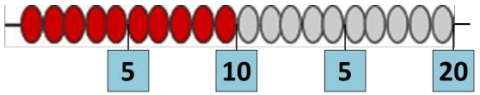
- Say the numbers from 1 to 20 in order pointing to numbers on the washing line as you do so.
- Match written to spoken numbers.

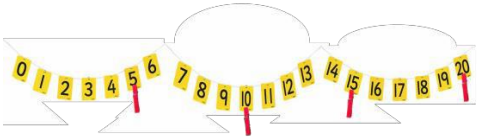
- Count objects, pointing to each object as you do so. Move them into a line and re-count from the children's left to right. Point out that there is the same number even though they are rearranged.

Counting on (on fingers or using sets of objects

Landmarked washing lines/ bead bars

- Use the landmarks of 5s to help place other numbers on a washing line or bead bar.
  E.g. Hang the 10 tag after the 10th bead. *Where do I hang 11?* ***How did you work that out?***



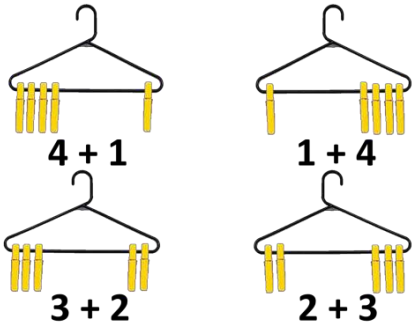


Make 'teen' numbers by counting on

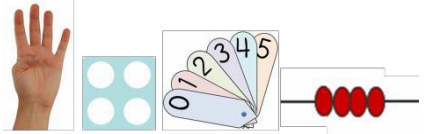
- Count from 1 to 20 pointing to numbers on a washing line as you do so.
- Call out '**teens**' numbers, showing the corresponding numbers card and ask children to show the correct numbers of beads on their 20-bead strings. *How*

Using number facts

- Investigate the story of 4, 5, 6, 7, 8 and 9.
  E.g. Partition 5 into **pairs** and record the related additions.



- Investigate **number bonds to 10**.
- Identify patterns e.g. 1 + 9 = 10, 2 + 8 = 10, 3 + 7 = 10 etc
- Show the missing number bond,
  e.g. 6 + = 10

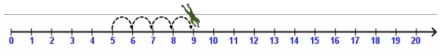


Order of calculation

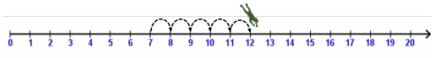
2 + 7 =

Counting on using a marked number line with marked divisions to 20

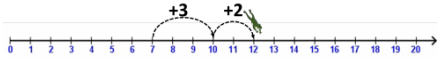
- Start on the **largest number**,
- **Count forward/up** in jumps on top of the **number line** when adding,
- Ensure to count the jumps,
- Demonstrate with frogs jumping along the line.
  e.g. 5 + 4 =



- Progress to numbers crossing 10.
  e.g. 7 + 5 =



- Extend to bridging ten, by using number bonds to 10.
  e.g. 7 + 5 =

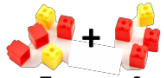


Adding to the next ten

- Identifying **number bonds for 10** to help,

- Confirm the amount in each **set** by counting the objects,
- **Count on** from largest number to find the **total**.

4 + 3 = 7

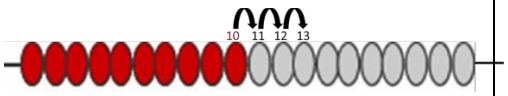


5 + 4 = 9

- Bar modelling

are you finding the right number of beads so quickly?

- **Count on** from 10 to make 'teen' numbers e.g. on bead bar/strings.



10 + 3 = ☐

- **Counting on** from other 2-digit numbers to make 'teen' numbers.
- Begin to introduce ☐ = 9 + 7 to show the symbolism of balanced calculations and commutative number sentences.

1 – 100

- **Counting up** to 100 using a 1 – 100 number grid,

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Snakes and ladders a good game to support this too.

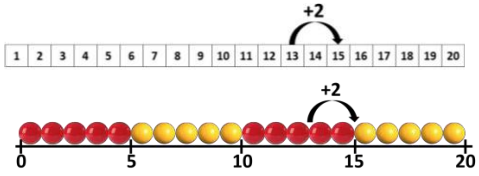
- Show children a coat hanger with 2 pegs at one end and 7 pegs at the other. Count on from 2 saying 3, 4, 5, … 9.
- Turn the coat hanger round to show 7 and 2. Instead of starting with 2 and counting on 7, start with 7 and count on 2!
- It's easier to put the larger numbers 1st.

2 + 7 = 7 + 2

Counting on

- Start/make on the **largest number**,
- **Count forward/up** in jumps on top of the **number track/line** when adding,
- Ensure to count the jumps.

13 + 2 =



Bar modelling

e.g. 36 + 4 =
45 + 5 =
23 + 7 =

- **Counting on** using a 1 – 100 number grid.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Adding ten

- **Counting on** using a 1 – 100 number grid.

e.g. 23 + 10 =

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Variation ideas

7 + 2 = **17 + 2 =** **7 + 12 =**
9 + 6 = **10 + 6 =** **11 + 6 =** **13 + 6 =**
8 + 3 = **10 + 3 =**

Using and applying: **Problem solving:**	* I can solve one-step problems that can involve addition and subtraction, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights (e.g. long/short, longer/ shorter, tall/ short, double/half) – Mass or weight (e.g. heavy/light, heavier than, lighter than) – Capacity/ volume (full/empty, more than, less than, quarter) – Time (quicker, slower, earlier, later)
New key vocabulary:	**number bonds, number line** **add, more, plus, make, sum, total, altogether** **inverse** **double, near double** **half, halve** **equals, is the same as (including equals sign)**

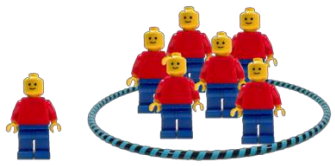
YEAR 1 — SUBTRACTION

Step 1	Step 2	Step 3	End of year expectation
* I am beginning to know that subtraction is taking away. * I can recall subtraction facts to 10 * I can subtract two 1-digit numbers * I can record my work using - and =	* I know that subtraction is taking away and finding out how many are left * I can use addition facts to 10 to determine related subtraction facts * I can subtract two 1-digit numbers * I am beginning to work out the value of a missing number	* I can use the vocabulary related to subtraction * I can recall subtraction facts to 20 * I am beginning to subtract 1-digit and 2-digit numbers to 20, including zero * I can work out the value of a missing number e.g. 30 - ? = 24	* **I can read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs** * **I can represent and use number bonds and related subtraction facts within 20** * **I can subtract 1-digit and 2-digit numbers to 20, including zero** * **I can solve missing number problems such as 7 = ? – 9**

Understand subtraction as 'take away'

7 people are on the bus. 1 is getting off at the next stop. How many will be left on the bus then?

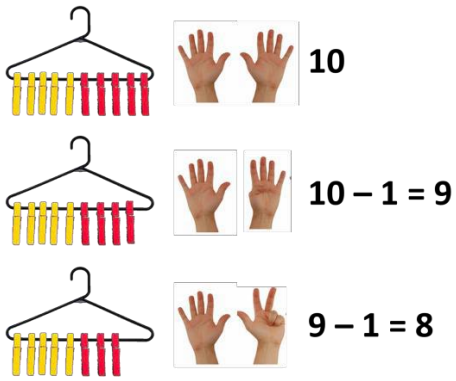
1. Use practical resources to remove what is being '**taken away**'.



2. Use/Draw images and physically 'cross off' what is being '**taken away**'.

Begin to count back to subtract

1. Show 5 red pegs and 5 yellow pegs on a coat hanger. How many pegs are there?
2. Chn put up 10 fingers.
3. Take off the last peg. Ask chn to fold down one finger. **How many** pegs are **left**?
4. What number sentence can we write?
5. Repeat with other examples. What number sentences can we write?



See how subtraction 'undoes' addition

1. Show 5 beads on a bead bar.
2. Count on 2, saying 6, 7 as you slide

Recall subtraction facts to 20

e.g. **19 – 4 =**

16 – 2 =

See how subtraction 'undoes' addition

1. Show 13 cubes.
2. Add 2 more cubes, counting on 14, 15 as the extra cubes are added.

3. Show what this will look like on a number line.

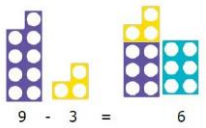
4. What number sentence can we write?

13 + 2 = □

5. How many cubes will we have if we took those cubes away again? Use cubes as a basic introduction to the Bar Model.

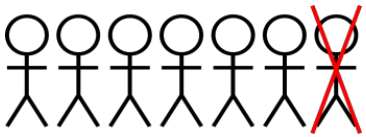
Find change by counting on

1. Demonstrate by choosing a child to role-play with.
2. Give the child a pencil labelled 8p and a 10 pence coin.
3. Take on the role of the shopkeeper and talk through the process, e.g. Thank you, that pencil is 8 pence please, you have given me 10p. **How much change** do I need to give you?
4. Tell chn that you are going to start at the 8 pence and count up until you reach 10p. Count on pennies, saying 9p, 10p as you hold up a finger for each penny. The number of pennies I have counted is how much change I need to give!
5. Demonstrate using the money line and doing 2 hops.



Numicon

For 9-6, take the 9 Numicon, place 6 on top then calculate the difference.



3. Model how to record 7 – 1 = 6 saying *7* ***take away*** *1 equals 6.*

Recall subtraction facts to 10

e.g.

9 – 4 = 5 

6 – 2 = 4 

8 – 3 = 5 

7 – 5 = 2 

beads across one at a time.
3. Check there are 7 beads afterwards.
4. What number sentence can we write?

5 + 2 = □

5. How many beads would we have if we took the beads away again?
6. Slide the 2 beads back, and ask chn to fold down 2 fingers. What do you notice? We're back where we started!
7. What number sentence could we write?

□ – 2 = 5

Missing numbers

7 - 3 = □ **□ = 7 - 3**

7 - □ = 4 **4 = 7 - □**

□ - 3 = 4 **4 = □ - 3**

□ - □ = 4 **4 = □ - □**

6. Show what this will look like on a number line.

7. What number sentence can we write

□ - 2 = 13

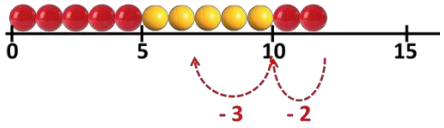
Subtracting tens from a 2-digit number

1. Place a counter on 78.
2. Demo counting back in tens using a 1 – 100 grid.
3. Record the subtraction. 78 – 20 = 58.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Subtracting bridging ten

1. Show 12 beads.
2. We could work this out by counting back in ones, we can target 10 (this way of taking away when we cross ten).
3. How many do we need to take away to reach 10? And **how many more** do we still need to take away? And what is 10 **take away** 3?
4. Show chn how this can be recorded on the 0–20 beaded line.



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New key vocabulary:	**number bonds, number line** **inverse** **half, halve** **equals, is the same as (including equals sign)** **difference between** **how many more to make..?, how many more is…than..?, how much more is..?** **subtract, take away, minus** **how many fewer is…than..?, how much less is..?**

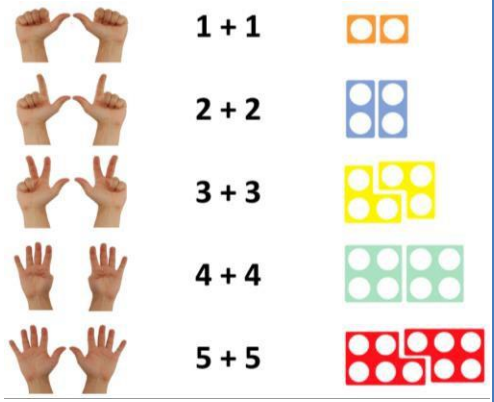
YEAR 1 — MULTIPLICATION

Step 1	Step 2	Step 3	End of year expectation
* I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects	* I can solve one-step problems involving multiplication and division, by calculating the answer using pictorial representations	* I am beginning to solve one-step problems involving multiplication and division, by calculating the answer using arrays with the support of the teacher	* **I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher**

Double numbers 1 to 5

Pupils build on learning in the Foundation Stage and ensure a clear understanding of the concept of doubling.

Using concrete objects, image representations and the use of physical or images of arrays, pupils solve problems such as:



Learn to count in 2s from 0

Learn to count in 5s and 10s

Multiplication using a penny number line (repeated addition)

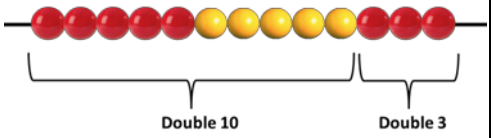
How much would 4 toy cars cost?

1. Demonstrate by counting in tens holding up a toy car as you do so, e.g. 10p … 20p … 30p … 40p.
2. Emphasise that this is called repeated addition.
3. Record this as 4 lots of 10 pennies on a penny number line.
4. Draw jumps along the penny line to show of the lots of 10p.
5. Begin to write this as 4 x 10 = 40.

Find doubles to double 20

Double 13

1. Show 13 on a 100 bead string. How many beads altogether?
2. Explain how double 10 is 20, jot down 20, and double 3 is 6, jot down 6, so 20 and 6 is 26.
3. Record 'double 13 is 26'.



10 + 10 = 20
3 + 3 = 6

20 + 6 =

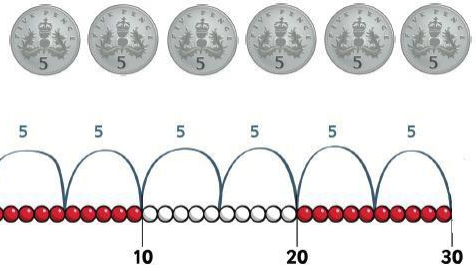
Record multiplication facts for the 2, 5 and 10 times tables

E.g.

1. How much money have I got here? How can I find out?

Using repeated addition to solve word problems

I have 6, 5p coins. How much do I have altogether?



Note how the use of two resources alongside here can support counting in 5s and 10s.

* Note that when using worded problems, the language aspect of this must be accessible – here, the use of talking tins or image based questioning might be needed to ensure equality of access to the mathematics aspect of the question.

* Make links with repeated addition and encourage the use of a range of equipment used alongside each other such as beads, coins and Numicon.

Double numbers up to 12

1. Explain that when we double a number we add that amount again e.g. 2 doubled is 2+2=4, 3 doubled is 3+3=6 etc.
2. Repeat with other numbers e.g. 6, 7, 10 etc using a variety of concrete objects alongside the written calculation.

3. Introduce the use of arrays to demonstrate doubling of any given number.

3 + 3

6 + 6

7 + 7

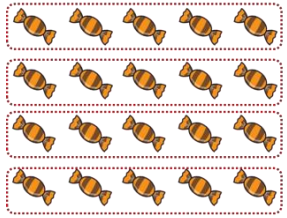
10 +10

Multiplication using 'sets of'

I have got 4 sets of 5 sweets.
How many sweets have I got all together?

1. Demonstrate that we can count in 5s 4 times, e.g. 5, 10, 15, 20! (i.e. repeated addition)
2. Write the number sentence 4 x 5 = 20 and talk it through, e.g. 4 is the number of sets and 5 is the number of buttons in each set.

3. Demonstrate how this can also be recorded as an array.



4 rows of 5

4 lots of 5

4 x 5

5 + 5 + 5 + 5

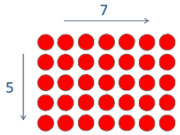
2. Count in 5s to find total.

3. What number sentence can we write?
5p + 5p + 5p + 5p + 5p + 5p + 5p = 35p

4. There is a quicker way to write this:

7 x 5p = 35p

5. Read this as seven lots of 5p or seven 5s. Point out that we can also say, 7 times 5. This means we had seven 5p coins, which is 35p altogether. Record 7 lots of 5p = 35p.
6. It can also be written as an array of 7 x 5.



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New key vocabulary:	**odd, even** **count in twos, threes, fives** **count in tens (forwards from/backwards from)** **how many times?** **lots of, groups of** **once, twice, three times, five times** **multiple of, times, multiply, multiply by** **repeated addition**

YEAR 1 DIVISION

Step 1	Step 2	Step 3	End of year expectation
* I can solve one-step problems involving division, by calculating the answer using concrete objects to group and share	* I can solve one-step problems involving division, by calculating the answer using pictorial representations to group and share	* I am beginning to solve one-step problems division, by calculating the answer using arrays with the support of the teacher to group	* **I can solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher**

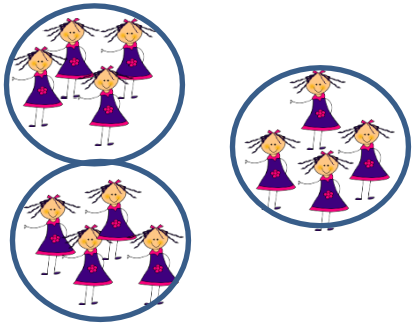
Physically group items and count in groups.

- Use practical resources to **group** items into hoops or drawn circles etc. and into visual arrays.
- Distribute objects into groups using '**bars**'.
- Group items and count how many are in each group, how many **'groups of'** there are and how many **altogether**.

- Using questioning and verbal explanations, pupils explain what the items represent. "There are x groups." "There are x in each group." "There are x altogether."

Using pictorial representations

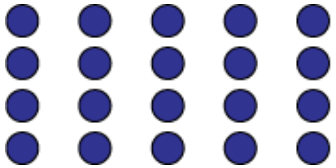
- Reinforce prior learning where division is understood by grouping and sharing: 12 girls play a game in groups of 4. How many are in each group?



- Share into groups using circles, hoops or boxes. Distribute into a divided bar.
- Using a bar, pupils begin to explore **halving** and then subsequent **quarter**ing as a way of sharing and using a bar (piece of paper) folder in half to create two groups onto which items can be drawn or placed. This extends to quarters and sharing
this into
4 groups.

Using arrays and understanding the symbols of written division.

- Build visual **arrays** of numbers to show groups of numbers and their totals which are explained and explored using discussion and verbal feedback.



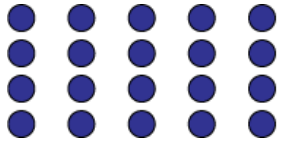
- Use arrays and visual representations to reinforce counting in 2s 5s and 10s.
- Explore related division facts and linking these directly to inverse, commutative facts:

6 ÷ 2 = □	□ = 6 ÷ 2
6 ÷ □ = 3	3 = 6 ÷ □
□ ÷ 2 = 3	3 = □ ÷ 2
□ ÷ ∇ = 3	3 = □ ÷ ∇

One Step Problems

- Use practical resources, visual representations or an array to solve a 'worded' problem or, a simple division calculation presented using simple symbols.

20 fish are shared between 5 bowls..
How many fish are in each bowl?
20 ÷ 5 = □



- Children begin to explore using a prepared bar to represent the array above.

Using and applying: **Problem solving:**	* I can solve one-step problems that can involve division, using concrete objects and pictorial representations * I can compare, describe and solve practical problems for: – Lengths and heights – Mass or weight – Capacity/ volume – Time
New key vocabulary:	**group, groups of** **bar** **altogether** **array** **half** **quarter** **divide, share, split**