ST ANNE'S AND GUARDIAN ANGELS PRIMARY SCHOOL

WRITTEN CALCULATIONS POLICY

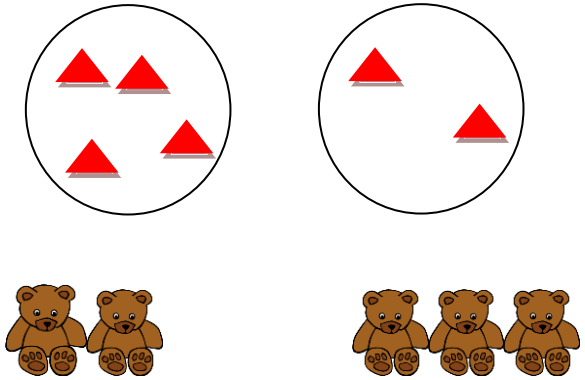
Reviewed: April 2023

- Excellence together with Christ at the centre-

Addition of whole numbers

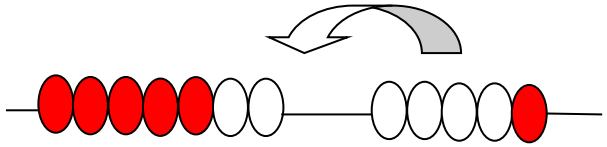
Objects / 'Hands on'

Counting objects, finding the total.



Bead string

7 + 5 = __



Dienes

T	O		T	O
3	3	+	2	5

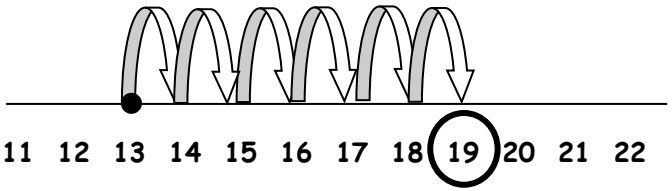
"5 tens and 8 ones is 58"

'Numbered' number line

Starting with 0-30 number lines and dry wipe pens.

13 + 6 = __

Find 13 and mark. Counting in 'jumps of 1', count on 6.



100 Square

Using laminated 100 square and dry wipe pens.

13 + 6 = __

Find 13 and mark. Count on 6 more.

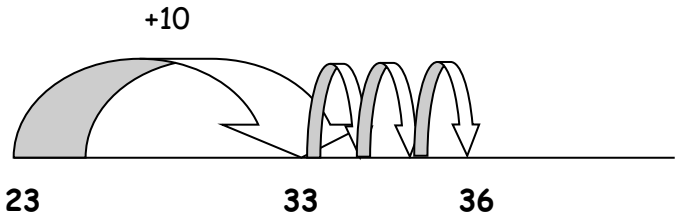
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

'Blank' number line

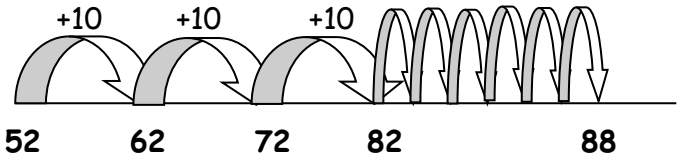
Use printed 'blank' number lines to 'count on' until children can move onto drawing them for themselves.

23 + 13 = __

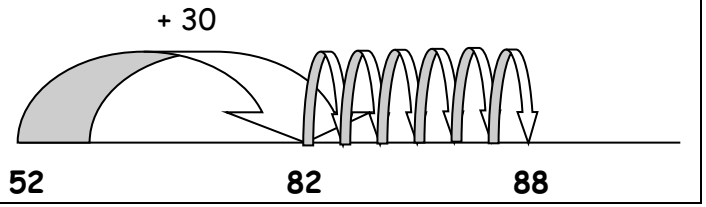
Always start with the greatest number.



52 + 36 = __



As children become more confident they can 'jump' along the number line in multiples of 10.

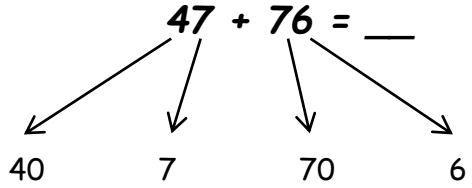


Addition of whole numbers

**Stages with brackets can be skipped if children are ready to move on*

Partition Method

47 + 76 = ___



40 7

70 6

110 + 13 = 123

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

Column Addition

Always work from right, moving left (i.e. start with the ones)

47 + 76 = ___

T O

47

+ 76

13 (7 + 6)

110 (40 + 70)

123

When ready, remove the brackets.

T O

47

+ 76

13

110

123

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

Column Addition

Always work from right, moving left (i.e. start with the ones)

47 + 76 = ___

T O

47

+ 76

123

1

Ensure that children label each column. Record any 'carried' digits under the bottom line.

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

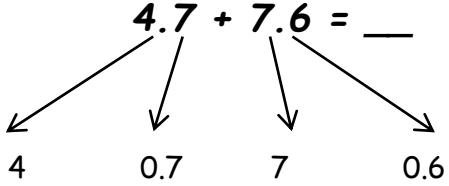
Addition of decimal numbers

**Stages with brackets can be skipped if children are ready to move on*

Partition Method (1 decimal place)

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

4.7 + 7.6 = __



To begin, 'use what you know' and calculate using whole numbers;

40 7	4 0.7
70 6	7 0.6
110 13 = 123	11 1.3 = 12.3

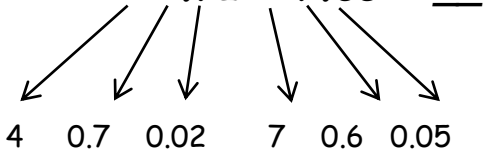
Always record a '0' to hold the place when dealing with decimals.

Next step: when confident, the final step can be missed out as when adding whole numbers.

Partition Method (2 decimal places)

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

4.72 + 7.65 = __



To begin, 'use what you know' and calculate using whole numbers;

400 70 2	4 0.7 0.02
700 60 5	7 0.6 0.05
1100 130 7 = 1237	11 1.3 0.07 = 12.37

Always record a '0' to hold the place when dealing with decimals.

Column Addition

Always work from right, moving left (i.e. start with the tenths)

4.7 + 7.6 = __

O.t
4.7
+ 7.6
1.3 (0.7 + 0.6)
11.0 (4 + 7)
12.3

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

Next step: when confident, as above but without the brackets.

Column Addition

Always work from right, moving left
(i.e. start with the hundredths)

4.72 + 7.65 = __

O . t h
4 . 7 2
+ 7 . 6 5
0 . 0 7 (0.02 + 0.05)
1 . 3 0 (0.7 + 0.6)
11 . 0 0 (4 + 7)
12. 3 7

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

Next step: when confident, as above but without the brackets.

Column Addition

Always work from right, moving left
(i.e. start with the hundredths)

4.72 + 7.65 = __

O . t h
4 . 7 2
+ 7 . 6 5
1 2 . 3 7
1

Ensure that children label each column. Record any 'carried' digits under the bottom line.

(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

Subtraction of whole numbers

Objects / 'Hands on'

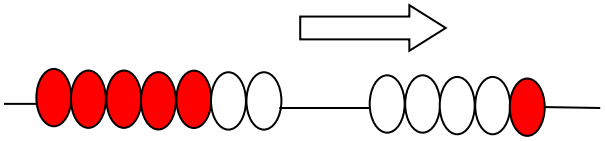
Counting objects, finding the total.

7 – 2 = __

Count out 7 objects and subtract (remove) 2.

Bead string

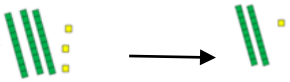
12 - 5 = __



Count out 12 beads, move 5 back along the string.

Dienes

T	O		T	O
3	3	-	1	2



*Physically remove 1 'ten' diene and 3 'ones' dienes to leave the answer. Note that when bridging 10, knowledge of exchange needs to be secure.

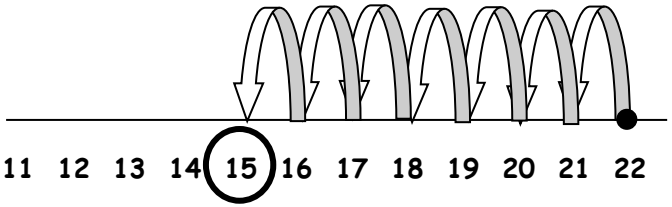
"2 tens and 1 one is 21"

'Numbered' number line

Starting with 0-30 number lines and dry wipe pens.

22 - 7 = __

Find 22 and mark. Counting in 'jumps of 1', count back 7.



100 Square

Using laminated 100 square and dry wipe pens.

26 - 9 = __

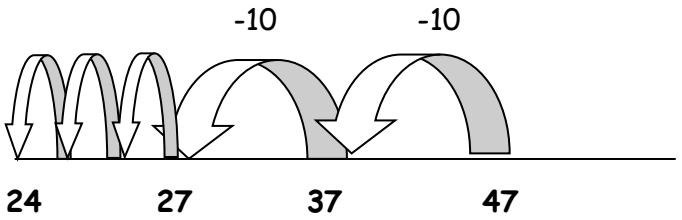
Find 26 and mark. Count back for 9.

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

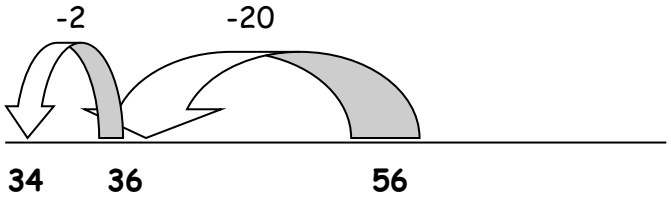
'Blank' number line

Use printed 'blank' number lines to 'count back' until children can move onto drawing them for themselves.

47 - 23 = __

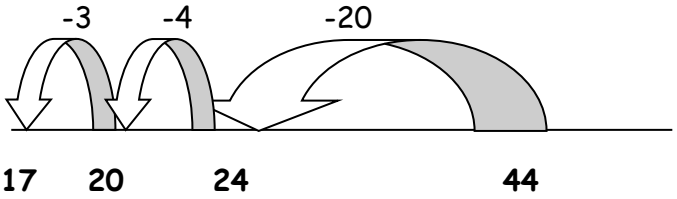


56 - 22 = __



As children become more confident they can 'jump' along the number line in multiples of 10 / bigger numbers.

44 – 27 =

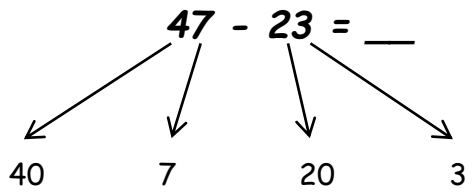


If confident with number bonds to 10, use knowledge to bridge through ten.

Subtraction of whole numbers

Partition Method (2 digits)

47 - 23 = ___



40	7		
20	3	-	
20	4	=	24

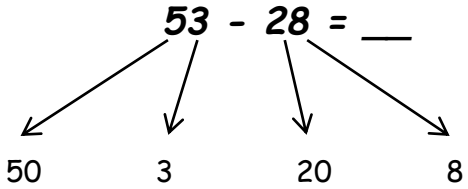
(Record one digit per box on squared paper. Ensure that the digits are lined up in the correct columns)

**Compensating ('taking 10')*

When the 'one' to be subtracted is greater than the 'one' you started with you will need to compensate by **taking** (not borrowing!) 10.

Partition Method (2 digit)

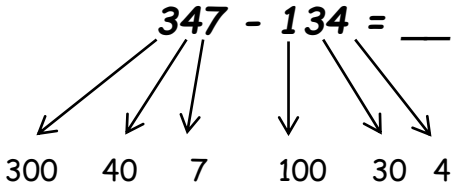
53 - 28 = ___



40	~~50~~	13	
	20	8	-
	20	5	= 25

Partition Method (3 digits)

347 - 134 = ___



300	40	7		
100	30	4	-	
200	10	3	=	213

Partition Method (3 digits **compensating)

542 - 366 = ___

400	130		
~~500~~	~~40~~	12	
300	60	6	-
100	70	6	= 176

Subtraction of decimal numbers

Partition Method (1 decimal place)

Always start with the most significant digit.

4.7 – 2.3 = __

To begin, 'use what you know' and calculate using whole numbers. As children become more confident this step can be missed out.

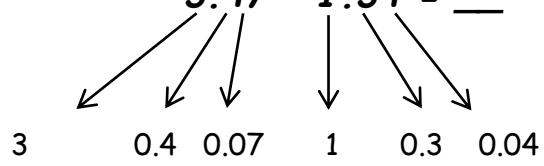
40 7	4 0.7
20 3 -	2 0.3 -
20 4 = 24	2 0.4 = 2.4

Always record a '0' to hold the place when dealing with decimals.

Partition Method (2 decimal places)

Always start with the most significant digit.

3.47 – 1.34 = __



To begin, 'use what you know' and calculate using whole numbers. As children become more confident this step can be missed out.

300 40 7	3 0.4 0.07
100 30 4 -	1 0.3 0.04 -
200 10 3 = 213	2 0.1 0.03 = 2.13

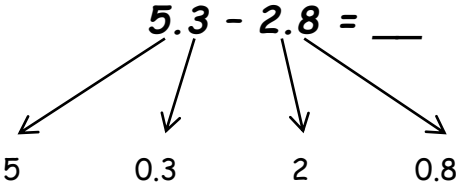
Always record a '0' to hold the place when dealing with decimals.

***Compensating ('taking 1')*

Partition Method (1 decimal place)

Always start with the most significant digit.

5.3 – 2.8 = __



4.0	1.3
~~5~~	~~0.3~~
2	0.8 -
2	0.5 = 2.5

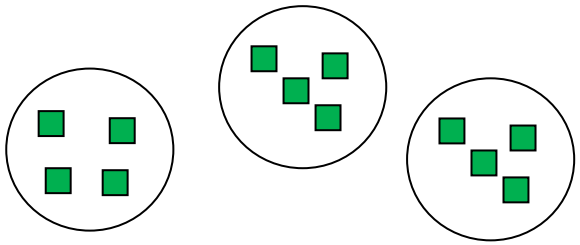
Always record a '0' to hold the place when dealing with decimals.

Multiplication of whole numbers

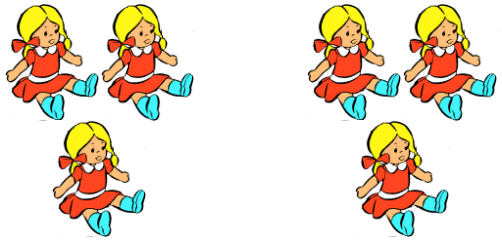
Objects / 'Hands on'

Children count sets or groups of objects.

4 x 3 = __



3 x 2 = __



Repeated Addition

Bead String

After counting sets of objects children should see that multiplication is repeated addition.

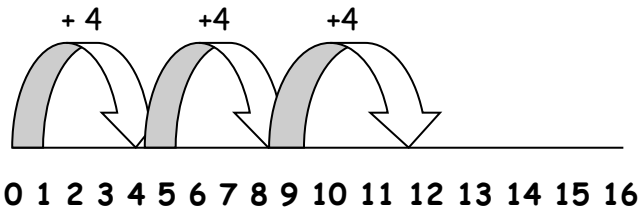
4 x 3 = __

(* Use opportunities to link to the inverse; 12 ÷ 3 = 4)

Number Lines

Using a 'numbered number line' and dry wipe pen.

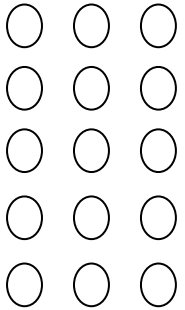
4 x 3 = __



Arrays

Arrays can be built using peg boards and cubes. When children are more confident they can be recorded on paper.

5 x 3 = __



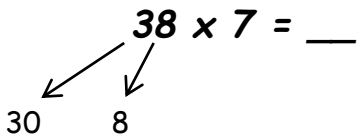
3 x 5 = 15

5 x 3 = 15

Multiplication of whole numbers

Grid Method (TO x O)

To begin give children printed blank grids to complete.

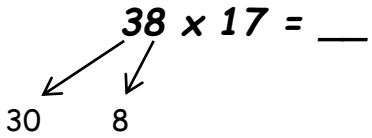


x	30	8	
7	210 +	56	= 266

(Children should record + and = symbols to find final answer)*

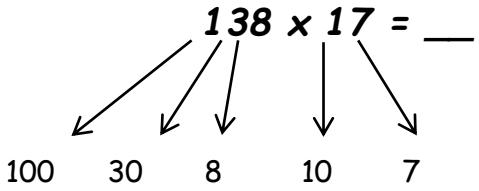
Grid Method (TO x TO)

To begin give children printed blank grids to complete.



x	30	8	
10	300 +	80	= 380
7	210 +	56	= 266
			646

Grid Method (HTO x TO)

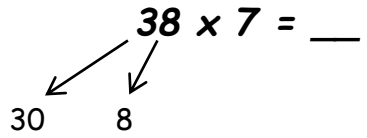


x	100	30	8	
10	1000 +	300	+ 80	= **1380**
7	700 +	210	+ 56	= **966**
				2346

Grid Method (HTO x HTO)

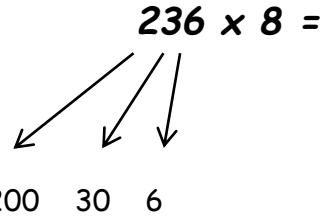
Grid method may be used but this would not be most efficient due to the extensive addition required. Children should be using long multiplication.

Partition Method (TO x O)



30 x 7 = 210
8 x 7 = 56
266

Partition Method (HTO x O)

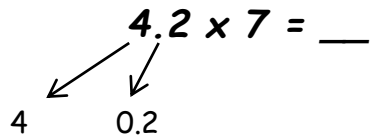


200 x 8 = 1600
30 x 8 = 240
6 x 8 = 48
1888

Multiplication of decimal numbers

Partition Method (O.th x O)

To begin give children printed blank grids to complete.

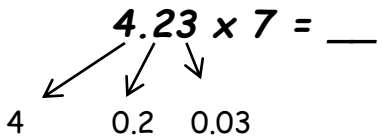


To begin, 'use what you know' and calculate using whole numbers. As children become more confident this step can be missed out.

40 x 7 = 280	4 x 7 = 28
2 x 7 = 14	0.2 x 7 = 1.4
280 + 14 = 294	28 + 1.4 = 29.4

Partition Method (O.th h x O)

To begin give children printed blank grids to complete.



To begin, 'use what you know' and calculate using whole numbers. As children become more confident this step can be missed out.

400 x 7 = 2800	4 x 7 = 28
20 x 7 = 140	0.2 x 7 = 1.40
3 x 7 = 21	0.03 x 7 = 0.21
2961	29.61

Short Multiplication

52
8 x
416
1

24.6
7 x
172.2
34

*Carried digits to be recorded below the line
Encourage children to record the decimal point in the answer box first

Long Multiplication

$$\begin{array}{r} 2\ 3\ 4 \\ \times\ 1\ 6 \\ \hline 1^{2}\ 4^{2}\ 0\ 4 \\ 2\ 3\ 4\ 0\ + \\ \hline 3\ 7\ 4\ 4 \end{array}$$

*Carried digits to be recorded as shown above.

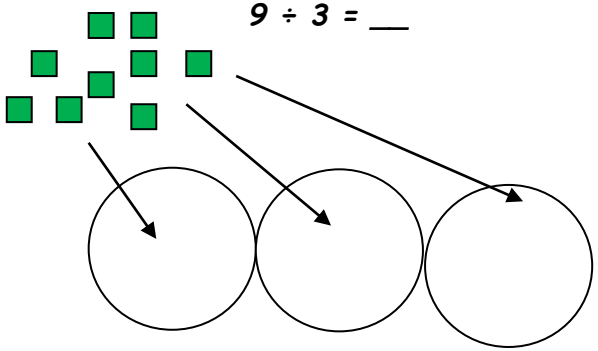
First multiply by the ones and record the answer before moving on to the tens.
For three digit numbers simply extend method to include a third row.

Division of whole numbers

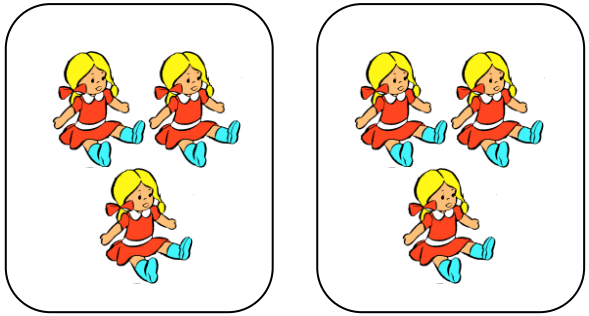
Objects / 'Hands on'

Children share cubes or objects into groups.

9 ÷ 3 = __



6 ÷ 2 = __

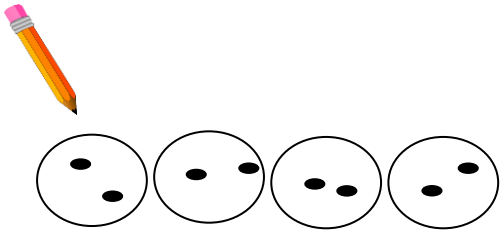


*Use opportunities to link to the inverse where appropriate

Jottings

8 ÷ 4 = __

Children draw 8 dots/markings into 4 groups or sets.

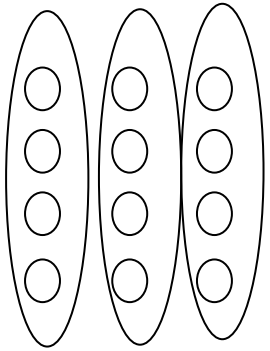


Arrays

Arrays can be built using peg boards and cubes. When children are more confident they can be recorded on paper.

12 ÷ 3 = __

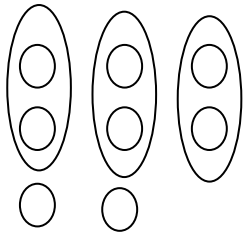
Children share 12 objects/dots into three columns then total each column.



4 4 4

This can also be used for calculations involving remainders.

8 ÷ 3 = __



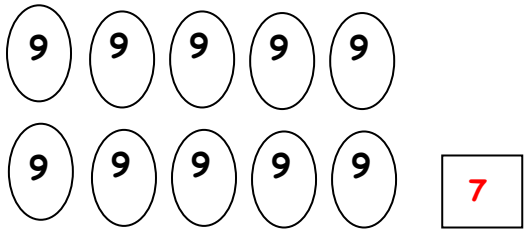
2 remainder 2

Division of whole numbers

Using Mental Strategies

Using knowledge of inverse and times tables.

97 ÷ 9 = __

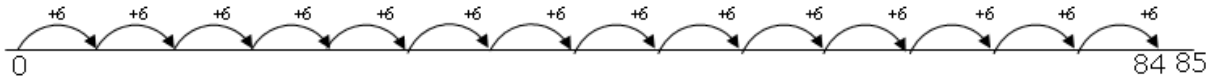


*Count up in 9s, recording how many 'lots of 9' as you go. Here we have 10 lots of 9 with 7 left over = 10 r 7.

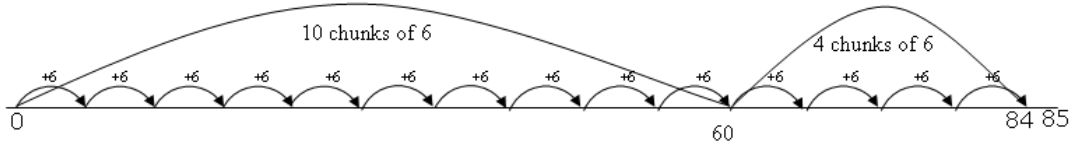
Using a number line

85 ÷ 6 = __

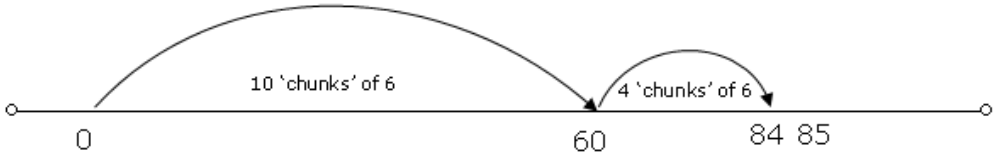
Children need to understand that this question is asking them 'how many lots of 6 are in 85?'
*Count up in 6s, recording as you go. Here we have 14 lots of 6 with 1 left over = 14 r 1.



Now we can move on to bigger 'chunks' of 6 such as 6x10 (60). First the 10 chunks of 6 are added as 60 then a further 4 chunks of 6 (24) are added to total 84, leaving 1 spare.



This can be simplified to:



Division of whole numbers

Short Division

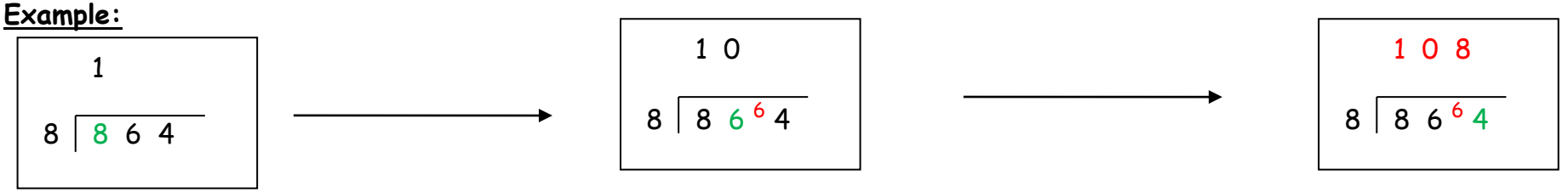
Children **must** have a good conceptual understanding of chunking and place value in order to move on to this stage.

1) Divide into the big number one digit at a time starting from the left (different from +, - and x)

2) Put the result from each division on the top

3) If the smaller number won't 'go into' the big number exactly, carry the remainder across (to the next digit on the right). If it won't 'go in' at all put a 0 on top and carry the whole digit.

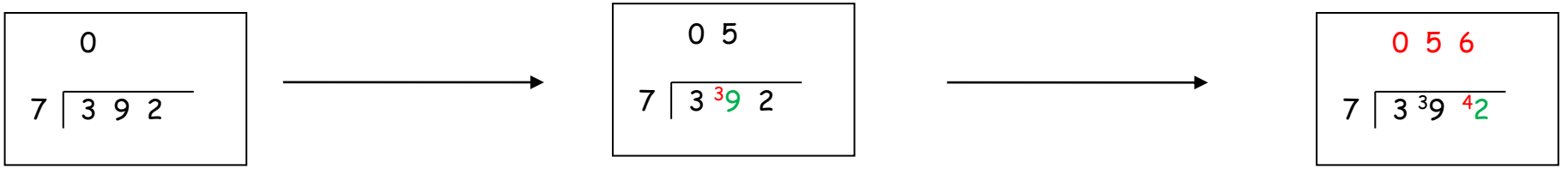
Example:



8 in to 8 goes once.

8 into 6 won't go, so carry 6.

8 into 64 goes 8 times exactly.



7 into 3 doesn't go, so carry 3.

7 into 39 goes 5 times with 4 left over. Carry the 4.

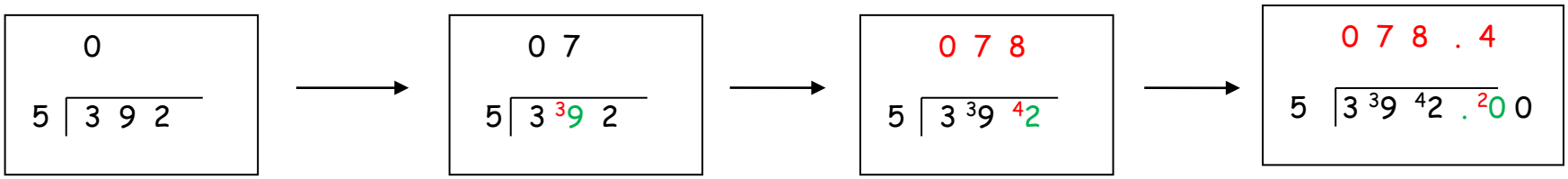
7 into 42 goes 6 times exactly.

Division of whole numbers

Short Division: Remainders and decimals

Following on from the previous method, remainders can be given as decimals by continuing digits into decimal places, carrying as needed.

Example:



Division of whole numbers

Division (Chunking) (HTO ÷ TO)

i) ***180 ÷ 12 = __***

```
    1 5
  ------
12 | 1 8 0
   - 1 2 0   (x 10)
     ---
       6 0
     - 6 0   (x  5)
     -----
       0 0
```

Answer: 15

ii) ***187 ÷ 11 = __***

```
    1 7
  ------
11 | 1 8 7
   - 1 1 0   (x 10)
     ---
       7 7
     - 7 7   (x  7)
     -----
       0 0
```

Answer: 17

Division (Chunking) (HTO ÷ TO)

****Remainders***

217 ÷ 15 = __

```
    1 4 r 7
  ---------
15 | 2 1 7
   - 1 5 0   (x 10)
     -----
       6 7
     - 3 0   (x  2)
     -----
       3 7
     - 3 0   ( x 2)
     -----
         7
```

Answer: 14 remainder 7

Division of whole numbers: Long Division

1) 13 into 2 doesn't go. Look at the next digit.

2) 13 into 27 goes twice.

So put a 2 above the 7.

2 times 13 is 26.

So take 26 from 27 to get the remainder.

3) Carry the 5 down.

13 into 15 goes once.

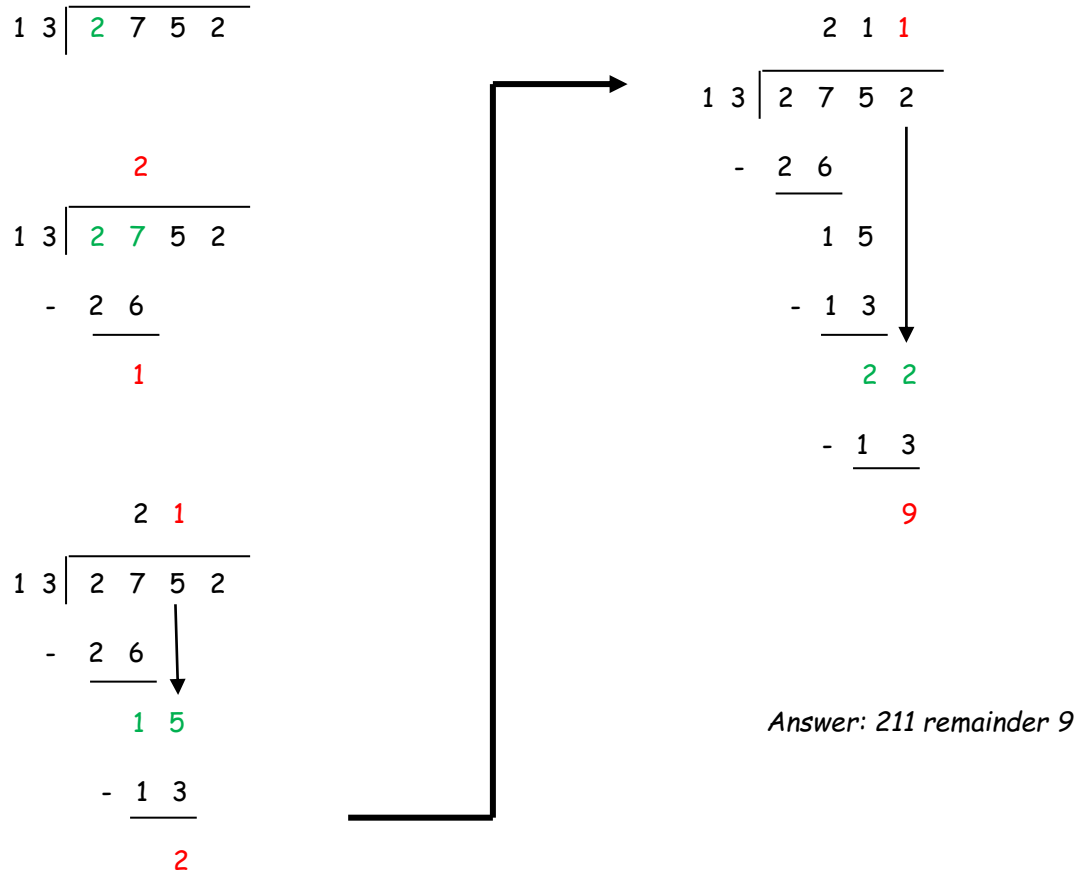
Subtract 13 (1x13) to find the remainder.

4) Carry the 2 down.

13 into 22 goes once.

Subtract 13 to find the remainder.

5) There are no more digits to carry down, so the calculation is finished!



Answer: 211 remainder 9

Written Calculations Policy – St Anne's and Guardian Angels School

This policy contains the key pencil and paper procedures that will be taught within our school. It has been written to ensure **consistency and progression** throughout the school.

Whilst this policy focuses on 'written' procedures it is important to recognise that counting and the ability to calculate mentally lies at the heart of the Primary Maths Curriculum. Counting and mental methods are to be taught systematically from Reception upwards and pupils should be given regular opportunities to develop these skills. However, mental calculation is not at the exclusion of written recording and should be seen as complementary to and not separate from it. Sharing written methods with the teacher encourages children to think about the mental strategies that underpin them and to develop new ideas and strategies. Therefore written recording both helps children to clarify their thinking and supports and extends the development of more fluent and sophisticated mental strategies.

During their time at this school children will be encouraged to see mathematics as both a written and spoken language, Teachers will support and guide children through the following important stages:

- The use of tangible objects (toys, cubes, beadstrings, Numicon) to explore and solve simple calculations
- The use of pictures and a mixture of words and symbols to represent numerical activities
- Using standard symbols and conventions
- The use of jottings to aid a mental strategy
- The use of standard pencil and paper procedures
- The use of a calculator

Children should be adequately supported at each stage of their development. Appropriate resources should be made available to enable children to achieve and progress, including:

- The use of tangible objects; toys, cubes, beadstrings, Numicon, straws, counters etc.
- 'Numbered' number lines to the appropriate length (0-10, 0-30, 0-50, 0-100) and 100 squares
- Printed 'blank' number lines and multiplication grids

Children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose – pictures, mental calculation with or without jottings, structured recording or a calculator. Our long term aim is for children to be able to select an efficient method of their choice that is appropriate for a given task. In order to achieve this, children should ask themselves the following questions;

- 'Can I do this in my head?'
- 'Can I do this in my head using drawings or jottings?'
- 'Do I need to use a pencil and paper procedure?'
- 'Do I need a calculator?'

[End of document]