



Swavesey Primary School

Calculation Policy March 2017

‘The National Curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.’

This policy outlines strategies used across the school for written calculation. The National Curriculum states that *‘by the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.’*

Addition- Year 1

Numbers up to 20 using resources to support.



Year 1 is an opportunity for children to develop firm foundations of addition. Their conceptual understanding is heavily developed through the use of resources. They gain confidence in mental calculation in preparation for using more formal written methods efficiently in year 2.

Addition - Year 1
Up to 20.

5 + 4 = 9

8 + 5 = 13

14 + 3 =

Number bonds to 10 → to 20

9+1, 8+2, 7+3, 6+4, 5+5, 10+0

WALT find number bonds to 10

numicon

2 + 2 = 4

1 + 9 = 10 ✓

8 + 2 = 10 ✓

5 + 5 = 10 ✓

3 + 7 = 10 ✓

2 + 8 = 10 ✓

3 + 7 = 10 ✓

2 + 8 = 10 ✓

1 + 9 = 10 ✓

0 + 10 = 10 ✓

Addition- Year 2

Addition of two digit numbers using resources moving towards column addition by the end of the year if secure. Children will use resources and jottings to gain an understanding of the process used for column addition followed by using the formal method if appropriate. Children will practically re-group (more than 10) using resources and may begin to express this as a written method.



Addition Year 2
Up to 100 (U+U+U, TU+U, TU+TU)

U+U+U
 $7+3+4=$

$7+3=10 + 4=14$

TU column method.

Tens	Units
 30	 2
 10	 2

- ① Add units : $2+2=4$
- ② Add tens : $30+10=40$

TU	
32	
+ 12	
44	

HTU

249		
+ 382		
621		

118 + 2 = 120

12080 + 40 = 12080

5000 + 200 + 300 = 5500

188 + 111 = 299

48 + 1 = 49

4080 + 10 = 4090

200100 + 100 = 200200

294 + 114 = 408

451 + 178 = 629

48 + 1 = 49

12050 + 70 = 12070

629400 + 100 = 629500

971 + 114 = 1085

580 + 1 = 581

100070 + 10 = 100080

1000900 + 100 = 1001000

Addition- Year 3

Addition of three digit numbers using resources to support column methods. Children will show re-grouping (more than 10) in their formal methods.



Addition Year 3

1. HTU+U
2. HTU+T
3. HTU+TU

1. $123 + 6 =$

H	T	U
		3

2. $123 + 20 =$

H	T	U
100	20	3

$100 + 40 + 3 = 143$

3. $123 + 135 =$

H	T	U
100	20	3
100	30	5
200	50	8

$200 + 50 + 8 = 258$

(see rod abacus)

H	T	U
1	2	3
+ 1	3	5
2	5	8

Addition with re-grouping
From Year 3.

(more than 10)

$227 + 124 =$

H	T	U
200	20	7
100	20	4
300	40	11

$300 + 40 + 11 = 351$

H	T	U
2	2	7
+ 1	2	4
3	5	1

Addition- Year 4

Addition of four digit numbers using column addition including re-grouping.



Addition Year 4
 Up to 4 digits. $1124 + 1232 =$

Th	H	T	U
1000	100	20	4
1000	200	30	2
$2000 + 300 + 50 + 6 = 2356$			

Addition - Year 4
 with regrouping
 $1257 + 1224 =$

Th	H	T	U
1000	200	50	7
1000	200	20	4
$1000 + 1000 = 2000$	$200 + 200 = 400$	$50 + 20 = 70$	$7 + 4 = 11$
Th	H	T	U
1	2	5	7
+	1	2	4
<hr/>			
2	4	8	1
<hr/>			
		1	

Subtraction-Year 1



Numbers up to 20 using resources to support.

Similarly to addition, subtraction in year 1 is an opportunity for children to develop firm foundations. Their conceptual understanding is heavily developed through the use of resources. They gain confidence mentally calculating in preparation for using more formal written methods efficiently in year 2.

The image shows different ways to subtract in order to consolidate their understanding of the concept of subtraction.

Subtraction - Year 1

Take away → $7 - 3 = 4$

Counting back → (beadstrings)

Difference →

Part whole →

Make 10 → $17 - 9 =$

1. take away 7
2. take away 2 more

Subtraction-Year 2



Subtraction - Year 2
 Up to 100. ^①TU-U, ^②TU;-T, ^③TU-TU
 (TU-U) 28-6 = (no regrouping)

T	U
11	• • • • • •

28	
6	?

57-30 =

T	U
57	30

65-23 =

T	U
65	5
- 20	- 3
40	+ 2

T	U
65	
- 23	
42	

Subtraction of 2 digit numbers using resources and progressing to written methods where appropriate.

Children are not expected to regroup for subtraction until year 3.

Subtraction-Year 4 and 5



Subtraction - Year 4
4 digits (Th H T U)

$$8742 - 6568 =$$

Th	H	T	U
8	7	4	2
-	6	5	6
<hr/>			
2	1	7	4

Year 5
- more than 4 and decimals

$$47253 - 28425 =$$

TTh	Th	H	T	U
4	7	2	5	3
-	2	8	4	2
<hr/>				
1	8	8	2	8

$$£ 427.58$$
$$- £ 225.25$$

$$£ 202.33$$

Year 4-

Subtraction of 4 digit numbers including regrouping using both practical methods and formal column subtraction.

Year 5-

Subtraction of numbers larger than 4 digits and decimals, including regrouping, using both practical methods and formal column subtraction.

Subtraction-Year 6



Subtraction-Year 6

1. More than 4 digits (as Y5)

2. Different decimal places

$$\begin{array}{r} 427.080 \\ - 15.125 \\ \hline 411.955 \end{array}$$

3. Solve multi-step problems.

6.10.16

LO: To subtract using written methods

E: 13500

$$\begin{array}{r} 15685 \\ - 2073 \\ \hline 2073 \\ 13612 \end{array}$$

E: 5000

$$\begin{array}{r} 32612 \\ - 42835 \\ \hline 37693 \\ 05042 \end{array}$$

E: 12000

$$\begin{array}{r} 75 \\ 5815 \\ - 45638 \\ \hline 12527 \end{array}$$

E: 20000

$$\begin{array}{r} 78 \\ 3812 \\ - 10284 \\ \hline 27908 \end{array}$$

E: 25000

$$\begin{array}{r} 7156 \\ 8281 \\ - 55795 \\ \hline 26816 \end{array}$$

E:

$$\begin{array}{r} 895 \\ 9828 \\ - 71764 \\ \hline 18864 \end{array}$$

Year 6-

Subtraction of numbers larger than 4 digits and decimals with different decimal places, including regrouping, using both practical methods and formal column subtraction.

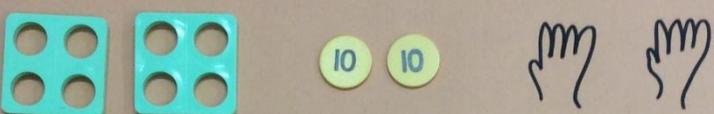
Year 6 children are expected to solve multi-step problems involving all four operations (+ - X ÷)

Multiplication- Year 1

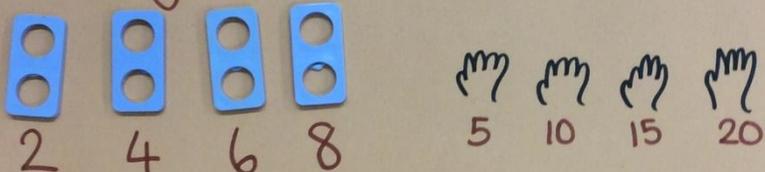


Multiplication - Year 1

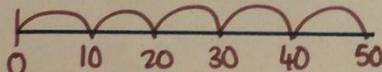
Doubling:



Counting in multiples:



2 4 6 8 5 10 15 20



0 10 20 30 40 50

9.2.17



$2 + 2 = 4$



$2 + 2 + 2 = 6$



$2 + 2 + 2 + 2 = 8$

Doubling and counting in multiples of 2, 5, 10. Children will use practical resources to solve multiplication problems.

Multiplication- Year 2

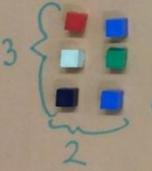


Multiplication Year 2

Repeated addition:
 $3 \times 2 =$

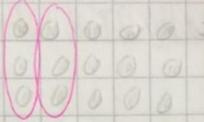

 $2 + 2 + 2 = 6$

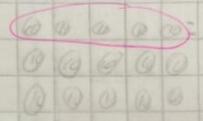
Arrays:
 $3 \times 2 =$

 3×2 or 2×3

← arrays showing commutative multiplication

Recall X facts: 2, 5, 10.

$5 \times 30 =$  $= 150$

$50 \times 3 =$  $= 150$

$23 \overline{) 1116}$
 10 To use known facts to multiply and divide

$0000 \quad 4 \times 2 = 8 \quad / \quad 2 \times 4 = 8 \quad /$
 $0000 \quad 00 \quad 0000$
 $00 \quad 0000$
 00

$2 \times 2 \times 2 = 8 \quad / \quad 40 + 40 = 80$
 $8 - 2 = 4 \quad / \quad 20 + 20 + 20 = 60$
 $4 \times 4 = 8 \quad /$
 $2 + 2 + 2 + 2 = 8 \quad /$
 $8 \div 4 = 2 \quad /$
 $8 \times 1 = 8 \quad /$
 $2 \times 40 = 80 \quad /$
 $20 \times 4 = 80 \quad /$

Children will use repeated addition, arrays and other practical resources to solve multiplication problems. Children are expected to learn their 2, 5 and 10 times tables and division facts for rapid recall which they are tested on weekly.

From 2018 year 6 children are likely to have a recall test as part of their SATS for multiplication and division facts up to 12X12.

Multiplication- Year 3



Multiplication-Year 3

TU x U

$24 \times 3 =$

x	20	4
3 20
	=60	=12

→

x	20	4
3	60	12
	60 + 12 = 72	

$73 \times 2 = (70 \times 2) + (3 \times 2)$ ✓

x	70	3
2	①①①①①①①①
	= 146 ✓	

x	x 40	3
3	①①①①①①①①
	= 129 ✓	

x	100	40	3
3	①①①①①①①①①①①①	①①①①①①①①
	= 329 ✓		

$300 + 120 + 9 = 429$ ✓

Multiplication of 2 digit numbers by 1 digit numbers using arrays and progressing to the use of grid method along with other practical resources. Children are expected to learn their 3, 4 and 8 times tables and division facts for rapid recall which they are tested on weekly.

From 2018 year 6 children are likely to have a recall test as part of their SATS for multiplication and division facts up to 12X12.

Multiplication- Year 4



Multiplication - Year 4

TU X U using grids or column method

$$\begin{array}{r} \text{T U} \\ 24 \\ \times 3 \\ \hline 72 \\ \hline \end{array}$$

$3 \times 4 = 12$ (U XU)
 $3 \times 20 = 60$ (UXT)
 $+ 10 = 70$

HTU X U

$$\begin{array}{r} \text{H T U} \\ 342 \\ \times 7 \\ \hline 2394 \\ \hline \end{array}$$

$7 \times 2 = 14$
 $7 \times 40 = 280$
 $+ 10 = 290$
↓ in tens
in hundreds

$7 \times 300 = 2100$
 $+ 200 = 2300$
↓ in hundreds
in thousands

X ÷ 6, 7, 9

Multiplication of 2 and 3 digit numbers by 1 digit numbers using grid method, practical resources and introducing column multiplication.

Children are expected to learn their 6, 7 and 9 times tables and division facts for rapid recall which they are tested on weekly.

From 2018 year 6 children are likely to have a recall test as part of their SATS for multiplication and division facts up to 12X12.



Multiplication- Year 5

Multiplication - Year 5
 TH T U X U: $4628 \times 5 =$

$$\begin{array}{r} 4628 \\ \times 5 \\ \hline 23140 \end{array}$$

$5 \times 8 = 40$
 $5 \times 20 = 100$
 $+ 40 = 140$
 $5 \times 600 = 3000$
 $+ 100 = 3100$
 $5 \times 4000 = 20000$
 $+ 3000 = 23000$

TU x TU (long multiplication)

$$\begin{array}{r} 32 \\ \times 24 \\ \hline 8 \quad (4 \times 2) \\ \hline 120 \quad (4 \times 30) \\ \hline 600 \quad (20 \times 2) \\ \hline 768 \quad \leftarrow + \text{them all up!} \end{array}$$

X \div up to 12x12

6.3.17
 L.O To use a formal written method for multiplication

705600490	$\times 80$	7	$= 6090$
072063			$= 6090$
			$+ 783$
			6090
			$+ 783$
			6873

$87 \times 79 = 6873$
 $55 \times 10 = 550$
 $55 \times 2 = 110$
 $660 \checkmark$
 $73 \times 10 = 730$
 $73 \times 4 = 292$
 $1022 \checkmark$
 $97 \times 10 = 970$
 $970 \times 2 = 1940 \times$

804000400 $\times 50$ 5 $= 4400$
 4675
 $+ 275$
 $4675 \checkmark$

5250 25 $= 275$
 58×21
 58
 $\times 21$
 $\hline 58$
 1160
 $+ 116$
 $1218 \checkmark$

79
 $\times 46$
 $\hline 474$
 3160
 $3634 \checkmark$

$79 \times 46 = 3634$
 $83 \times 24 = 1992$
 83
 $\times 24$
 $\hline 332$
 1660
 $1992 \checkmark$

$326 \times 23 = 7498$
 326
 $\times 23$
 $\hline 978$
 6520
 $7498 \checkmark$

$161 \times 23 = 3703$
 161
 $\times 23$
 $\hline 483$
 3220
 $3703 \checkmark$

Multiplication of 4 digit numbers by 1 and 2 digit numbers using grid method, practical resources and column multiplication.

Children are expected to recall times tables and division facts for rapid recall up to 12x12 which they are tested on weekly.

From 2018 year 6 children are likely to have a recall test as part of their SATS for multiplication and division facts up to 12x12.

This provides a breakdown as a guide!

Multiplication- Year 6



Multiplication - Year 6
Up to 4 digits by 2 digits

3 digits: 124×26

4 digits: 1654×32

Handwritten breakdown of 124×26 showing partial products: 24 (6×4), 200 (6×20), 600 (6×100), 80 (20×4), 400 (20×20), 2000 (20×100).

Final sum: 3224 (with note "add them up").

Final sum: 3308 (with notes: "(units x everything)", "(place holder)", "(tens x everything)", "(add them up)").

7.3.17
L.O. To use a formal written method for multiplication

Starter

$79 \times 24 = 1992$

$83 \times 24 = 1992$

$326 \times 23 = 7498$

$161 \times 23 = 3703$

$1232 \times 26 = 6032$

$2614 \times 18 = 11052$

$3969 \times 95 = 92055$

$41740 \times 96 = 740000$

Multiplication of multi-digit numbers up to 4 digit by 2 digit numbers using column multiplication.

Children are expected to recall times tables and division facts for rapid recall up to 12×12 which they are tested on weekly.

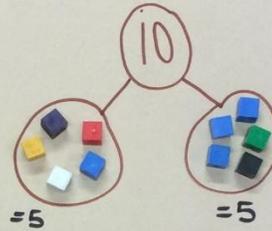
From 2018 year 6 children are likely to have a recall test as part of their SATS for multiplication and division facts up to 12×12 .

Division- Year 1

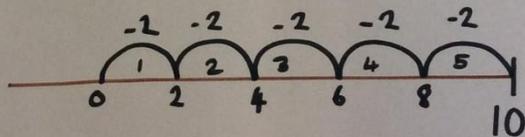


Division- Year 1

Sharing: 10 shared between 2



Grouping: 10 divided into groups of 2



Kim has 12 counters to put in 2 bags. How many counters are in each bag?
 $12 \div 2 = 6$ ✓

WALT share objects into groups to solve division problems

Tom has 10 flowers to share equally between 2 vases. How many flowers can be put in each vase?
 $10 \div 2 = 5$ ✓

Kim has 10 apples to put in 2 bags. How many apples are in each bag?
 $10 \div 5 = 2$ ✓

Matt has 10 marbles to put equally in 2 bags. How many marbles can be put in each bag?
 $10 \div 2 = 5$ ✓

Sam has 9 sweets to share between 3 friends. How many sweets does each person get?
 $9 \div 3 = 3$ ✓

Well done

Solve division problems using practical resources to share (sharing objects into the correct number of groups) and group (divide objects into groups of...).

Division- Year 2



Division- Year 2

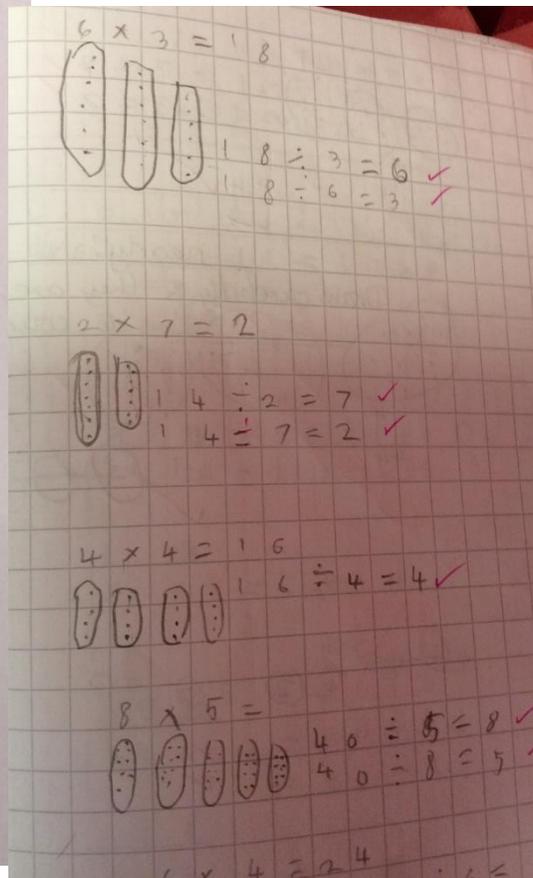
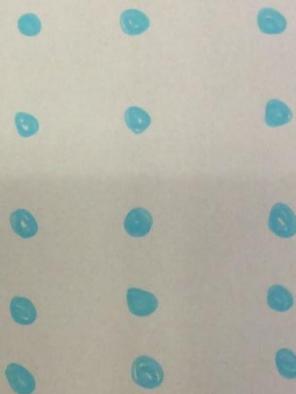
Arrays:
(linked to multiplication)

$$15 \div 3 = 5$$

$$15 \div 5 = 3$$

$$3 \times 5 = 15$$

$$5 \times 3 = 15$$



Children continue using strategies from year 1 to solve problems as well as using arrays. Arrays support the children to see the link between multiplication and division therefore children should be beginning to use their recall facts (2,5,10) to solve multiplication and division problems.

Division- Year 3

Divide two digit numbers by one digit numbers using practical resources to support the introduction of short division (bus stop method).



Division - Year 3

Arrays with remainders:

$$10 \div 3 = 3 \text{ r } 1$$

1 remainder

Short division:

1 group of 3 ten sticks → 1 2 → 2 groups of 3

1 group of 3 ten sticks → 1 5 ← 5 groups of 3 in 15

3 | 3 6

3 | 4 5

move to sticks

6. $24 \div 8 = 3$ ✓ ✓ $4 \times 4 = 16$

7. $16 \div 4 = 4$ ✓ $4 \times 4 = 16$

8. $15 \div 3 = 5$ ✓ $5 \times 3 = 15$

9. $20 \div 2 = 10$ ✓ $10 \times 2 = 20$

10. $35 \div 5 = 7$ ✓ $5 \times 7 = 35$

11. $36 \div 4 = 9$ ✓ $4 \times 9 = 36$

L.O. To solve division with

1. $3 \overline{) 36} \checkmark \checkmark$

T	U
(III)	(OO)
(III)	(OO)

2. $4 \overline{) 84} \checkmark$

T	U
(IIII)	(OO)
(IIII)	(OO)

3. $6 \overline{) 66} \checkmark$

T	U
(IIII)	(OOOO)
(IIII)	(OOOO)

L.O. short division

$3 \overline{) 32} \checkmark$ $3 \overline{) 34} \times$ $2 \overline{) 21} \checkmark$

$3 \overline{) 39} 6$ $2 \overline{) 26} 8$ $4 \overline{) 48} 4$

$4 \overline{) 22} \checkmark$ $3 \overline{) 31} \checkmark$ $2 \overline{) 22} \checkmark$

$4 \overline{) 88}$ $3 \overline{) 93}$ $3 \overline{) 66}$

$5 \overline{) 55} \checkmark$ $4 \overline{) 48} \checkmark$ $4 \overline{) 44} \checkmark$

$3 \overline{) 39} \checkmark$ $6 \overline{) 66} \checkmark$ $3 \overline{) 93} \checkmark$

$3 \overline{) 25} \checkmark$ $4 \overline{) 24} \checkmark$ $3 \overline{) 82} \checkmark$

$4 \overline{) 52} \checkmark$ $8 \overline{) 98} \checkmark$ $2 \overline{) 71} \checkmark$

$6 \overline{) 72} \checkmark$ $4 \overline{) 64} \checkmark$ *great!*

$3 \overline{) 26} \checkmark$ $5 \overline{) 75} \checkmark$

Division- Year 4



Division- Year 4

3 digits by one digit
Short division

$$\begin{array}{r} 218 \\ 4 \overline{) 872} \end{array}$$

$$\begin{array}{r} 086r2 \\ 5 \overline{) 432} \end{array}$$

$$\begin{array}{r} 3 \quad 91 \div 5 = 18 r 1 \checkmark \\ 18r1 \\ 5 \overline{) 94} \end{array}$$

$$\begin{array}{r} 4 \quad 101 \div 4 = 25 r 1 \checkmark \\ 025r1 \\ 4 \overline{) 101} \end{array}$$

$$\begin{array}{r} 5 \quad 94 \div 5 = 18 r 4 \checkmark \\ 18r4 \\ 5 \overline{) 94} \end{array}$$

$$\begin{array}{r} 6 \quad 84 \div 6 = 14 \checkmark \\ 14 \\ 6 \overline{) 84} \end{array}$$

$$\begin{array}{r} 7 \quad 362 \div 4 = 90 r 2 \checkmark \\ 090r2 \\ 4 \overline{) 362} \end{array}$$

$$\begin{array}{r} 8 \quad 289 \div 7 = 41 r 2 \checkmark \\ 041r2 \\ 7 \overline{) 289} \end{array}$$

Divide three digit numbers by one digit numbers using practical resources to support short division (bus stop method).

Division- Year 5



Division - Year 5
4 digits by 1 digit with remainders

$$\begin{array}{r} 1305 \text{ r}2 \\ 5 \overline{) 6527} \end{array}$$

Decimals:

$$\begin{array}{r} 156.1 \text{ r}1 \\ 4 \overline{) 624.5} \end{array}$$

L.O: To divide using an efficient method

1) $248 \div 5 = 49 \text{ r}3$ ✓

$$\begin{array}{r} 049 \text{ r}3 \\ 5 \overline{) 248.0} \end{array}$$

2) $346 \div 6 = 57 \text{ r}4$ ✓

$$\begin{array}{r} 057 \text{ r}4 \\ 6 \overline{) 346.0} \end{array}$$

3) $765 \div 6 = 127.5$ ✓

$$\begin{array}{r} 127.5 \\ 6 \overline{) 765.0} \end{array}$$

4) $432 \div 8 = 54$ ✓

$$\begin{array}{r} 054 \\ 8 \overline{) 432} \end{array}$$

Divide four digit numbers by one or two digit numbers and some decimals, using practical resources to support short division (bus stop method).

Division- Year 6



Division - Year 6
Up to 4 digits by 2 digits

$$\begin{array}{r}
 355r1 \\
 12 \overline{) 4261} \\
 \underline{24} \\
 186 \\
 \underline{180} \\
 61 \\
 \underline{60} \\
 1
 \end{array}$$

or

$$\begin{array}{r}
 212 \\
 12 \overline{) 2544} \\
 \underline{24} \\
 14 \\
 \underline{12} \\
 24 \\
 \underline{24} \\
 0
 \end{array}$$

← This method is in the curriculum however we encourage short division for accuracy.

1 remaining hundred →

2 remaining tens →

6) $2679 \div 3 = 893$ ✓

$$\begin{array}{r}
 0893 \\
 3 \overline{) 2679} \\
 \underline{6} \\
 26 \\
 \underline{24} \\
 27 \\
 \underline{24} \\
 39 \\
 \underline{36} \\
 3
 \end{array}$$

7) $3478 \div 6 = 579r2$ ✓

$$\begin{array}{r}
 579r2 \\
 6 \overline{) 3478} \\
 \underline{30} \\
 47 \\
 \underline{42} \\
 58 \\
 \underline{54} \\
 48 \\
 \underline{48} \\
 2
 \end{array}$$

8) $4521 \div 7 = 645r3$ ✗

$$\begin{array}{r}
 0645r3 \\
 7 \overline{) 4521} \\
 \underline{42} \\
 32 \\
 \underline{28} \\
 41 \\
 \underline{42} \\
 3
 \end{array}$$

9) $9876 \div 2 = 4938$ ✓

$$\begin{array}{r}
 4938 \\
 2 \overline{) 9876} \\
 \underline{18} \\
 87 \\
 \underline{86} \\
 16 \\
 \underline{16} \\
 0
 \end{array}$$

★ ★ ★

Divide 4 digit numbers by 2 digit numbers interpreting remainders as whole numbers, fractions or round, where appropriate.

Long division is a method that is taught in school. Recent changes to our teaching of division enforces the use of short division which generally children can use more efficiently if taught using resources to support the concept. Where children struggle with long division, it is advisable to let your child's class teacher know so we can support your child/ren at school.