



Southway Junior School Progression in Calculation

Progression from
Year 3 to Year 6



The following Progression in Calculation policy has been written to meet the requirements of the National Curriculum 2014 for the teaching and learning of Mathematics.

The Progression in Calculation policy is designed to give consistent progression of learning in calculation from year 3 through to year 6. This policy is organised according to age appropriate expectations as set out in the National Curriculum 2014.

The methods shown are only written ways of calculating. Children will also be calculating using mental strategies too.

During their time at Southway, children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental and written methods that they understand and can use correctly.

When faced with a calculation, children are able to decide which method is most appropriate and have strategies to check its accuracy. They will do this by asking themselves:

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

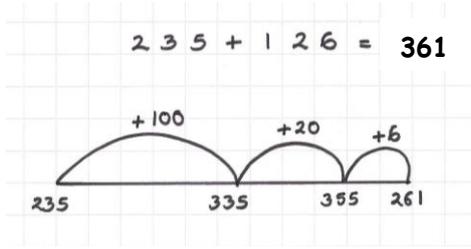
The overall aim is that when children leave Southway in Year 6 they:

- have a secure knowledge of **number facts** and a good understanding of the **four operations**.
- are able to use this knowledge and understanding to **carry out calculations mentally** and to apply general strategies when using one-digit and two-digit numbers and particular strategies to special cases involving bigger numbers.
- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;
- **have an efficient and reliable written method of calculation** for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally.
- have rapid recall of **all** the times tables and related division facts.
 - the National Curriculum expectation is that by the end of Year 4, children are able to recall all 12 tables up to 12x12.

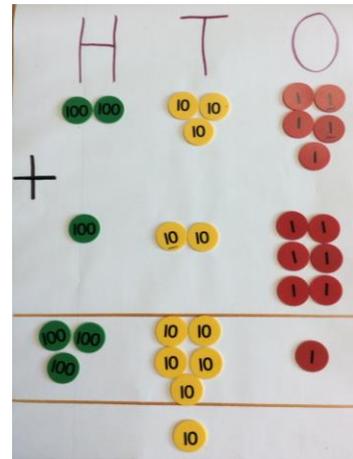
ADDITION

Year 3: Add numbers with up to 3 digits

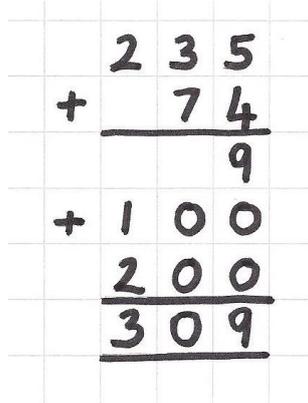
Number line



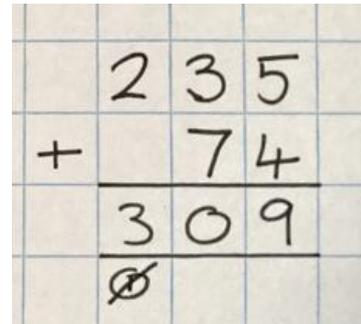
Place value



Expanded column

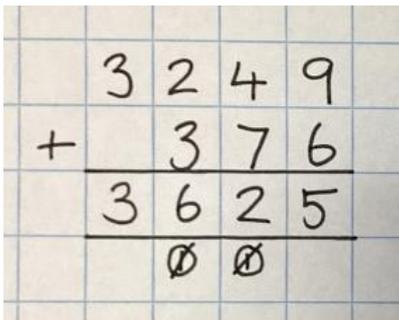


Compact column addition

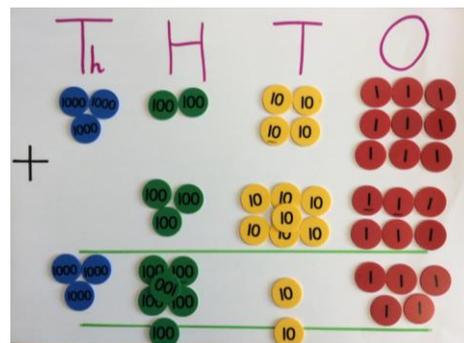


Year 4: Add numbers with up to 4 digits

Compact column addition



Place value counters



ADDITION

Year 5: Add numbers with more than 4

Compact column addition

$$\begin{array}{r} \pounds 42.59 \\ + \pounds \quad 7.67 \\ \hline \pounds 50.26 \\ \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

$$\begin{array}{r} 39502 \\ + \quad 8794 \\ \hline 48296 \\ \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

Year 6: Add several numbers of increasing complexity

Compact column addition

$$\begin{array}{r} 26.381 \\ \quad 9.080 \\ \quad 4.770 \\ + \quad 2.600 \\ \hline 42.831 \\ \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

$$\begin{array}{r} 82409 \\ 20071 \\ \quad 7690 \\ + \quad 4142 \\ \hline 114312 \\ \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

Year 3: Subtract with 2 and 3-digit numbers

SUBTRACTION

Place value counters

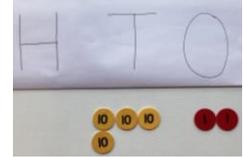
$$74 - 32 = 42$$



Create the number you are subtracting from (minuend)



Remove the number you are subtracting (subtrahend)



This leaves you with what is remaining which is the answer (difference)

Partitioned column subtraction

$$\begin{array}{r}
 74 - 32 = 70 \quad 4 \\
 - 30 \quad 2 \\
 \hline
 40 + 2 = 42
 \end{array}$$

Compact column subtraction

$$\begin{array}{r}
 \overset{4}{1} \overset{1}{3} \\
 - \quad 38 \\
 \hline
 115
 \end{array}$$

Year 4: Subtract with up to 4-digit numbers

Compact column subtraction

$$\begin{array}{r}
 \overset{6}{3} \overset{1}{7} \overset{1}{4} \overset{1}{3} \\
 - 1561 \\
 \hline
 2182
 \end{array}$$



Create the number you are subtracting from (minuend)



Remove the number you are subtracting (subtrahend)



This leaves you with what is remaining which is the answer (difference)

SUBTRACTION

Year 5: Subtract with at least 4-digit numbers

Compact column subtraction

$$\begin{array}{r}
 \overset{2}{\cancel{2}} \overset{11}{\cancel{2}} \overset{9}{\cancel{0}} \overset{13}{\cancel{4}} \overset{17}{7} \\
 - \quad \quad 4 \quad 1 \quad 5 \quad 8 \\
 \hline
 2 \quad 7 \quad 8 \quad 8 \quad 9
 \end{array}$$

Year 6: Subtract with increasing large and more complex numbers and decimal values

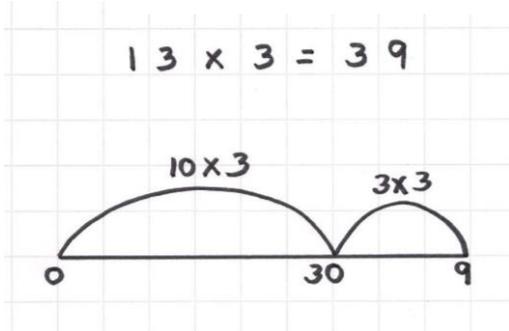
Compact column subtraction

$$\begin{array}{r}
 \overset{9}{\cancel{0}} \overset{9}{\cancel{0}} \overset{15}{\cancel{5}} \overset{7}{\cancel{7}} \overset{8}{\cancel{9}} \overset{18}{8} \\
 - \quad \quad 9 \quad 8 \quad 6 \quad 8 \quad 9 \\
 \hline
 0 \quad 0 \quad 7 \quad 1 \quad 0 \quad 9
 \end{array}$$

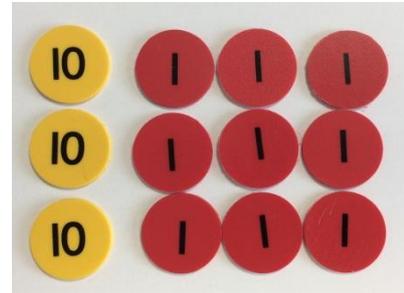
MULTIPLICATION

Year 3: Multiply 2-digit numbers by a 1-digit number

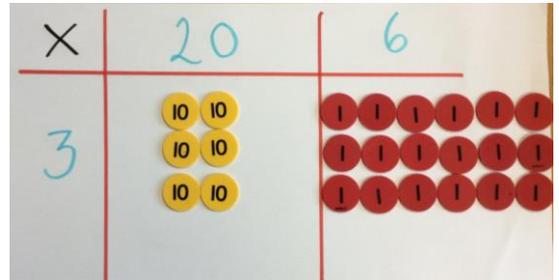
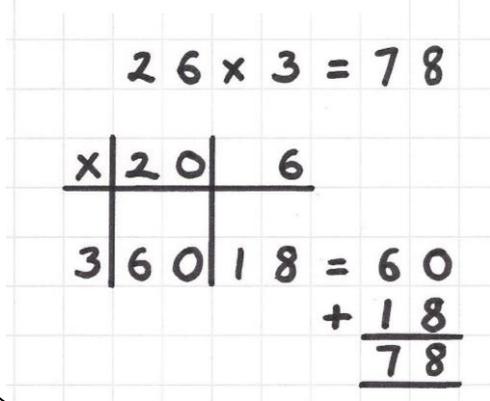
Number line



Place value counters

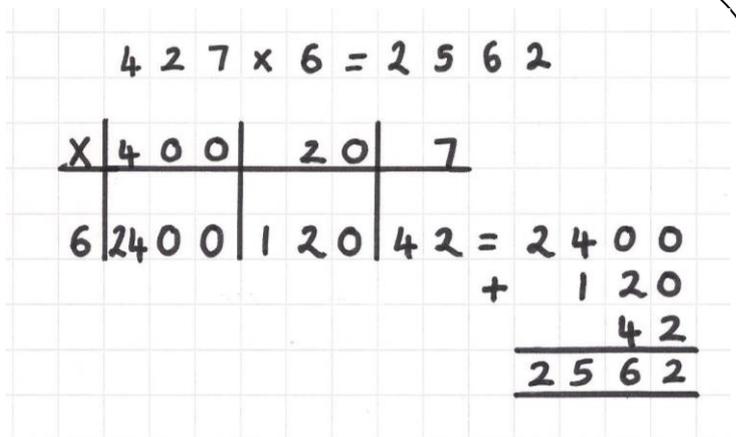


Grid multiplication

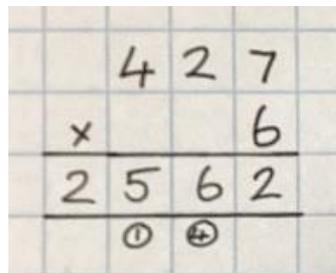


Year 4: Multiply 2 and 3-digit numbers by a 1-digit number

Grid multiplication



Short multiplication



MULTIPLICATION

Year 5: Multiply up to 4-digit numbers by 1 or 2 digit numbers

Short multiplication

$$\begin{array}{r} 4562 \\ \times \quad 7 \\ \hline 31934 \\ \text{\textcircled{3}} \text{\textcircled{4}} \text{\textcircled{0}} \end{array}$$

Long multiplication

$$\begin{array}{r} 1324 \\ \times \quad 16 \\ \hline 7944 \\ \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{2}} \\ \hline 13240 \\ \hline 21184 \\ \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

Year 6: Multiply up to 4-digit numbers by 1 or 2 digit numbers (see Year 5) and multiply decimals with 2 decimal places by a 1-digit number.

Short multiplication

$$\begin{array}{r} 4.29 \\ \times 8 \\ \hline 34.32 \\ \text{\textcircled{2}} \text{\textcircled{0}} \end{array}$$

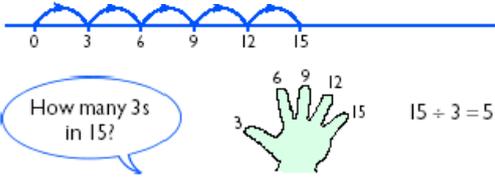
Long multiplication

$$\begin{array}{r} 1324 \\ \times \quad 16 \\ \hline 7944 \\ \text{\textcircled{0}} \text{\textcircled{0}} \text{\textcircled{2}} \\ \hline 13240 \\ \hline 21184 \\ \text{\textcircled{0}} \text{\textcircled{0}} \end{array}$$

DIVISION

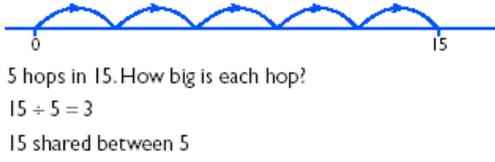
Year 3: Divide 2-digit numbers by a 1-digit number (where there is no remainder in the final answer)

Grouping



How many 3s in 15?

$15 \div 3 = 5$



5 hops in 15. How big is each hop?

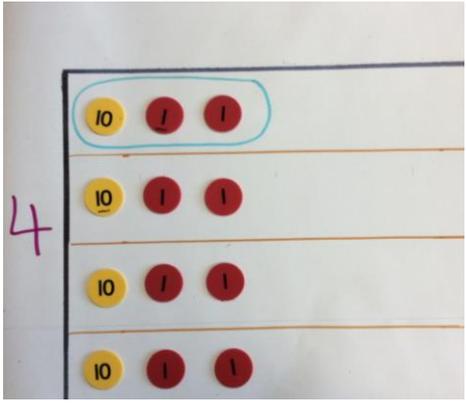
$15 \div 5 = 3$

15 shared between 5

Division using arrays

Place value counters

$48 \div 4 = 12$

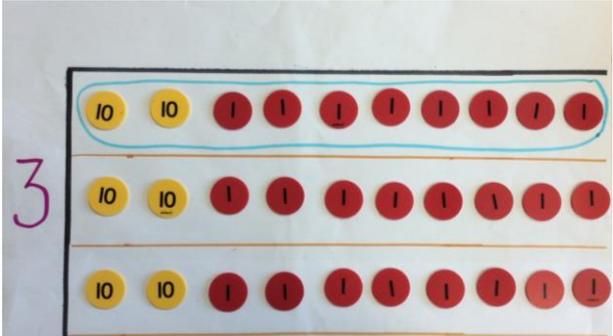


Year 4: Divide up to 3-digit numbers by a 1-digit number (without remainders initially)

Division using arrays

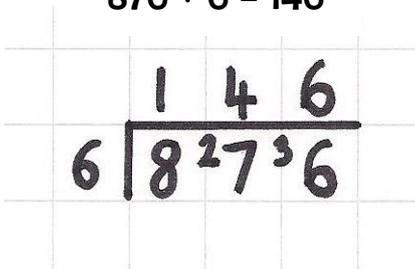
$84 \div 3 = 28$

Place value counters

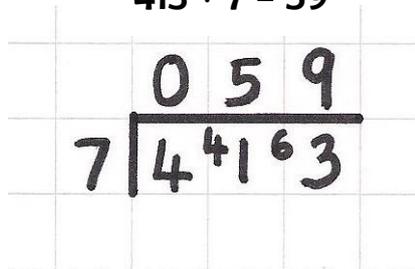


Short division

$876 \div 6 = 146$



$413 \div 7 = 59$



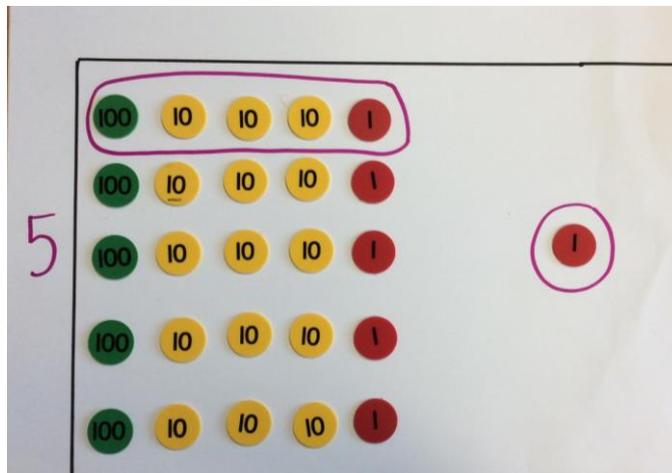
DIVISION

Year 5: Divide up to 4 digits by a 1-digit number, including those with remainders.

Division using arrays

Place value counters

$$656 \div 5 = 131 \text{ r}1$$



Short division

$$4,935 \div 8 = 616 \text{ r}7$$

$$\begin{array}{r} 0616 \text{ r}7 \\ 8 \overline{)4935} \end{array}$$

Year 6: Divide at least 4 digits by both 1-digit and 2-digit numbers (including decimal numbers and quantities)

Short division

$$6,497 \div 8 = 812.125$$

$$\begin{array}{r} 0812.125 \\ 8 \overline{)6497.000} \end{array}$$

Year 6: Divide at least 4 digits by both 1-digit and 2-digit numbers (including decimal numbers and quantities)

DIVISION

Short division (2-digit divisor)

$$5,012 \div 14 = 358$$

Handwritten work on grid paper showing the short division of 5,012 by 14. The work includes a multiplication table for 14 and a long division layout.

14

1.	10	+	4	=	14
2.	20	+	8	=	28
3.	30	+	12	=	42
4.	40	+	16	=	56
5.	50	+	20	=	70
6.	60	+	24	=	84
7.	70	+	28	=	98
8.	80	+	32	=	112
9.	90	+	36	=	126
10.	100	+	40	=	140

14 $\overline{)5012}$ 0358