



Maths at Droxford Junior School

'To inspire and educate for life'





Maths at Droxford Junior School

Our aims:

When children leave primary school they:

- have a secure knowledge of number facts and a good understanding of the four operations and to have an efficient, reliable method of calculating each of the four operations
- are able to use this knowledge and understanding to carry out calculations mentally
- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than they can keep in their heads





Mental Maths

Mental skills For addition

- Know by heart number bonds to 100 and use these to derive related facts. (E.g. $3.46 + 0.54 = 4$)
- Derive quickly, and without difficulty, number bonds to 1000
- Add small and large whole numbers where the use of place value or number facts makes the calculation achievable 'in our heads'. (E.g. $34,000 + 8000$)
- Add multiples of powers of ten and near multiples of the same. (E.g. $6345 + 199$)
- Add negative numbers in a context such as temperature where the numbers make sense
- Add two 1-place decimal numbers or two 2-place decimal numbers less than 1. (E.g. $4.5 + 6.3$ or $0.74 + 0.33$)
- Add positive numbers to negative numbers. (E.g. calculate a rise in temperature, or continue a sequence beginning with a negative number)
- Use place value and number facts to add two or more numbers, including money and decimals. (E.g. $3 + 8 + 6 + 4 + 7$, $0.6 + 0.7 + 0.4$, or $2,056 + 44$)

Mental Skills for Subtraction

- Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition. (E.g. $1000 - 654$ as $46 + 300$ in our heads)
- Use number bonds to 1 to 10 to perform mental subtraction of any pair of 1-place or 2-place decimal numbers using complementary addition and including money. (E.g. $10 - 3.65$ as $0.35 + 6$, $£50 - £34.29$ as $71p + £15$)
- Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to two places. (E.g. $467,900 - 3,005$ or $4.63 - 1.02$)
- Subtract multiples of powers of ten and near multiples of the same
- Subtract negative numbers in a context such as temperature where the numbers make sense



Mental Maths

Mental skills for Multiplication

- Know by heart all the multiplication facts up to 12×12
- Multiply whole numbers and decimals with up to three places by 10, 100 or 1000. (E.g. $234 \times 1000 = 234,000$ and $0.23 \times 1000 = 230$)
- Identify common factors, common multiples and prime numbers and use factors in mental multiplication. (E.g. 326×6 is 652×3 which is 1956)
- Use place value and number facts in mental multiplication. (E.g. $40,000 \times 6 = 240,000$ and $0.03 \times 6 = 0.18$)
- Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25. (E.g. 28×25 is $\frac{1}{4}$ of $28 \times 100 = 700$)
- Use rounding in mental multiplication. (E.g. 34×19 as $(20 \times 34) - 34$)
- Multiply 1- and 2-place decimals by numbers up to and including 10 using place value and partitioning. (E.g. 3.6×4 is $12 + 2.4$ or 2.53×3 is $6 + 1.5 + 0.09$)
- Double decimal numbers with up to 2 places using partitioning. (E.g. 36.73 doubled is double 36 (72) plus double 0.73 (1.46))

Mental skills for Multiplication

- Know by heart all the division facts up to $144 \div 12$
- Divide whole numbers by powers of 10 to give whole number answers or answers with up to three decimal places
- Identify common factors, common multiples and prime numbers and use factors in mental division. (E.g. $438 \div 6$ is $219 \div 3$ which is 73)
- Use tests for divisibility to aid mental calculation
- Use doubling and halving as mental division strategies, including to divide by 2, 4, 8, 5, 20 and 25. (E.g. $628 \div 8$ is halved three times: 314, 157, 78.5)
- Divide 1- and 2-place decimals by numbers up to and including 10 using place value. (E.g. $2.4 \div 6 = 0.4$ or $0.65 \div 5 = 0.13$, $\pounds 6.33 \div 3 = \pounds 2.11$)
- Halve decimal numbers with up to 2 places using partitioning
- (E.g. Half of 36.86 is half of 36 (18) plus half of 0.86 (0.43))
- Know and use equivalence between simple fractions, decimals and percentages, including in different contexts
- Recognise a given ratio and reduce a given ratio to its lowest terms



Addition Methods

Progression in teaching addition: number lines

Using a number line or using place value cards and place value apparatus to partition numbers and recombine.

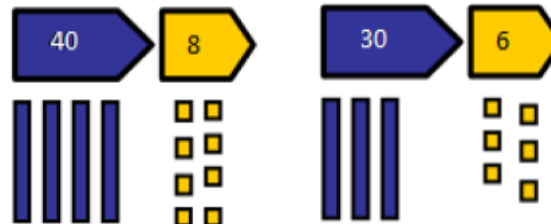
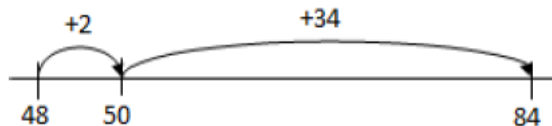
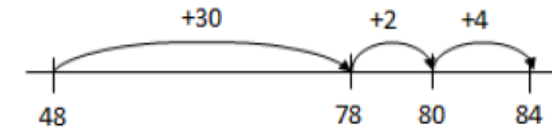
E.g. $48 + 36 = 84$

$$\underline{40 + 30 + 8 + 6}$$

$$40 + 30 = 70$$

$$8 + 6 = 14$$

$$70 + 14 = 84$$





Addition Methods

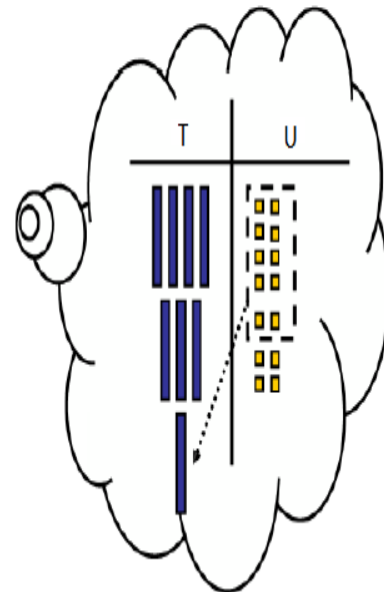
Movement towards standard written methods

We introduce expanded column addition which enables children to see what happens to numbers in the standard written method. This can be modelled with place value counters or Dienes so that children can see how it works.

E.g. $48 + 36$

As we can't have 14 units, the children would then add $70 + 10 + 4$, to give the answer of 84

$$\begin{array}{r} \text{T U} \\ 48 \\ + 36 \\ \hline 14 \\ + 70 \\ \hline 84 \end{array}$$





Addition Methods

Formal written method for addition

Children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm.

E.g.

$$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ 11 \end{array} \quad \begin{array}{r} 172.83 \\ + 54.68 \\ \hline 227.51 \\ 111 \end{array}$$

Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers.

Finally, children progress to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. They will continue calculating with decimals, including those with different numbers of decimal places.

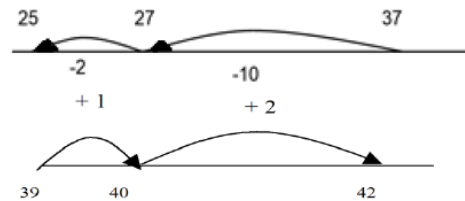
National curriculum year 3
expectations



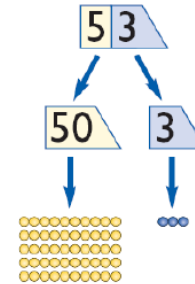
Subtraction Methods

Progression in teaching subtraction: number lines

E.g.



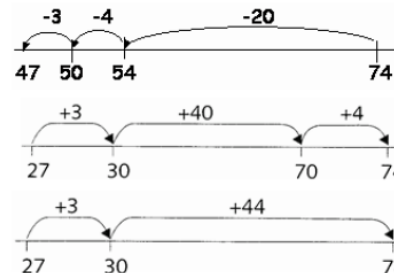
At this stage, children begin to partition numbers in order to take away. E.g



The link between the two may be supported by an image like this, with 47 being taken away from 72, leaving the difference, which is 25.

E.g. $74 - 27 = 47$

Children can decide whether to count on or count back



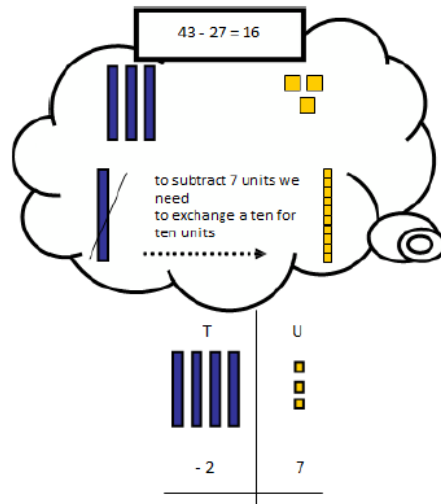


Subtraction Methods

Movement towards standard written methods

We introduce expanded column subtraction (this is where the number is expanded out into 100, 10s and units etc. see below for example), initially with no decomposition. Once children are confident with the procedure, we introduce crossing tens boundaries in this format, modelled visually with place value counters or Dienes. This method enables children to see what happens to numbers in the standard written method.

E.g.



$$\begin{array}{r} 30\cancel{4} + 10\cancel{3} \\ 20 + 7 \\ \hline 10 + 6 \end{array}$$



Subtraction Methods

Formal written method for subtraction

The previous stages reinforce what happens to the numbers when they are subtracted using more formal methods. It is important that the children have a good understanding of place value and partitioning. If children have this, they may begin to use a formal columnar algorithm, initially introduced alongside the expanded method. (National Curriculum Year 3 expectations.) The formal method should be seen as a more streamlined version of the expanded method, not a new method.

E.g.

$$\begin{array}{r} 89^{12} 3^{12} \\ 4 \ 5 \ 7 \ - \\ \hline 4 \ 7 \ 5 \end{array}$$

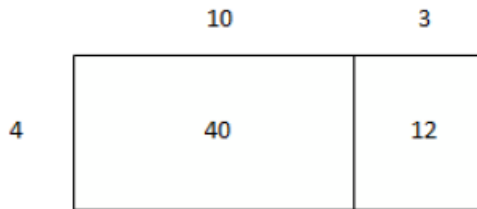
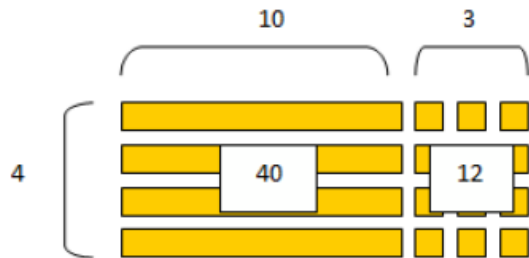
National curriculum year 3
expectations



Multiplication Methods

Progression in teaching addition: number lines to the grid method

We use place value apparatus (modelled with place value counters or Dienes) to support the multiplication of $U \times TU$ alongside the grid method when introduced.



$$\begin{array}{r} 40 \\ 12 \\ \hline 52 \end{array} +$$



Multiplication Methods

Formal written method for multiplication: long & short multiplication

$18 \times 13 =$

	10	8
10	100	80
3	30	24

$$\begin{array}{r} 18 \\ \times 13 \\ \hline 54 \\ 180 \\ \hline 234 \end{array}$$

Note:

Children use their taught method for addition to complete this multiplication procedure.

Children continue to refine and deepen their understanding of written methods including fluency for using long multiplication.

Short Multiplication :National curriculum year 5 expectations

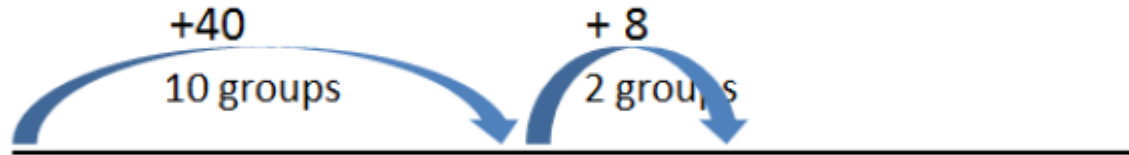
Long Multiplication :National curriculum year 5/6 expectations



Division Methods

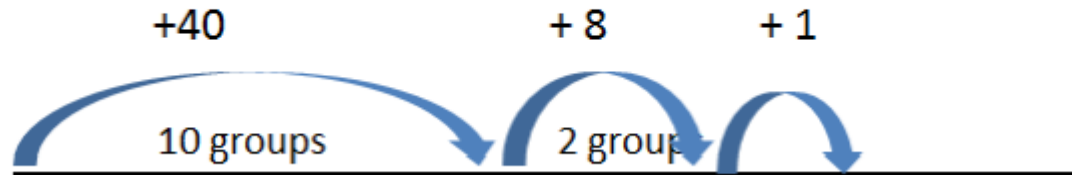
Progression in teaching division: number lines

E.g. $48 \div 4 = 12$



Remainders

$49 \div 4 = 12 \text{ r}1$





Division Methods

Formal written method for division: long & short division

E.g. $432 \div 5 = 86 \text{ r } 2$

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \end{array}$$

Short Division :National
curriculum year 5 expectations



Division Methods

Formal written method for division: long & short division

E.g.

Or $432 \div 15 = 28 \text{ r } 12$
Or $432 \div 15 = 28 \frac{4}{5}$

Or $432 \div 15 = 28.8$

$$\begin{array}{r} 15 \overline{) 432} \\ \underline{300} \quad (15 \times 20) \\ 132 \\ \underline{120} \quad (15 \times 8) \\ 12 \end{array}$$

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \downarrow \\ 132 \\ \underline{120} \downarrow \\ 120 \\ \underline{120} \downarrow \\ 120 \end{array}$$

Note:

We encourage children to make multiplication jottings to support their division.

Long Division :National curriculum year 6 expectations



At the end of KS2 maths: the SATs

Children will sit three papers in maths:

- Paper 1: arithmetic, 30 minutes
- Papers 2 and 3: reasoning, 40 minutes per paper
- Paper 1 will consist of fixed response questions, where children have to give the correct answer to calculations, including long multiplication and division. Papers 2 and 3 will involve a number of question types, including:
 - Multiple choice
 - True or false
 - Constrained questions, e.g. giving the answer to a calculation, drawing a shape or completing a table or chart
 - Less constrained questions, where children will have to explain their approach for solving a problem



Sample KS2 maths arithmetic questions

$$6.1 + 0.3 =$$

$$5 \times 4 \times 7 =$$

$$4^2 = \quad \frac{1}{9} + \frac{4}{9} =$$

$$1,440 \div 12 =$$

$$630 \div 9 =$$

$$1,034 + 586 =$$

$$20\% \text{ of } 1,500 =$$

$$2.5 + 0.05 =$$

$$\frac{4}{5} - \frac{1}{5} =$$

$$24 \times 3 =$$

$$100 \times 100 =$$

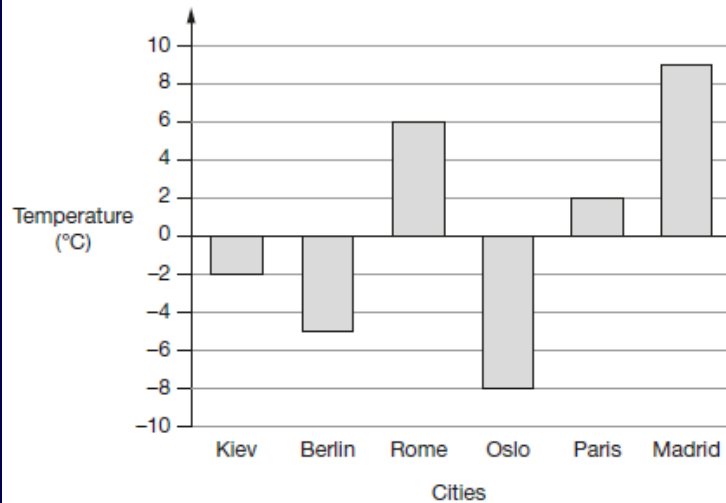
$$48 \div 6 =$$

$$1.28 \times 100 =$$



Sample KS2 maths reasoning questions

This graph shows the temperature in six cities on one day in January.



Which city was 4 degrees **warmer** than Kiev?

1 mark



Sample KS2 maths reasoning questions

Write the two missing digits to make this long multiplication correct.

$$\begin{array}{r} 4\boxed{} \\ \times \boxed{}6 \\ \hline 246 \\ 820 \\ \hline 1066 \end{array}$$

3 marks



Sample Ks2 maths reasoning questions

Here is a number written in Roman numerals.

CXV

Write the number in figures.

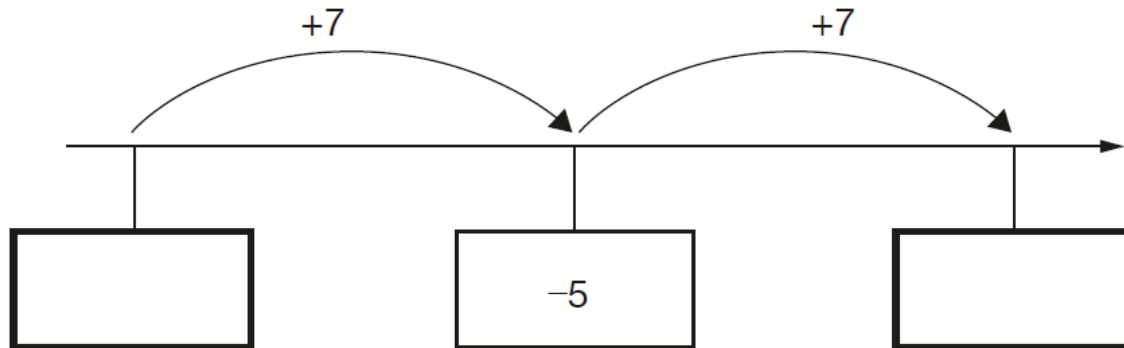
1 mark



Sample KS2 maths reasoning questions

Here is part of a number line.

Write the missing numbers in the boxes.



2 marks

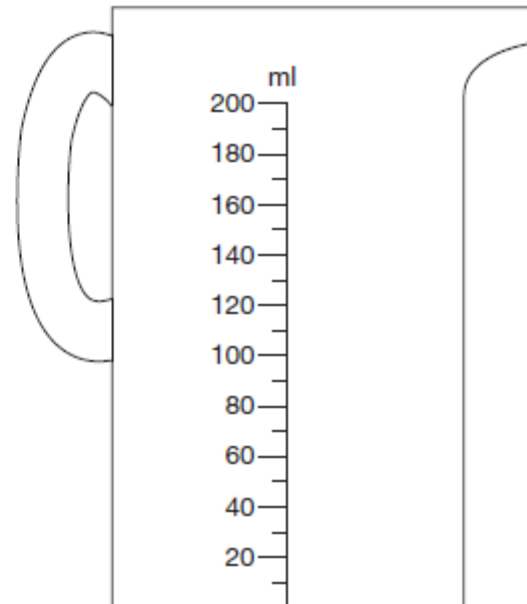


Sample KS2 maths reasoning questions

5

Chen pours 165 millilitres of milk into a measuring jug.

Draw an arrow on the jug to show the level of the milk.



1 mark



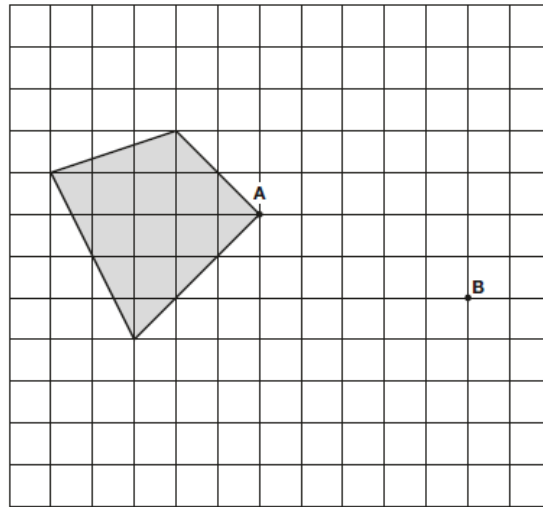
Sample KS2 maths reasoning questions

Here is a shaded shape on a grid.

The shape is translated so that point **A** moves to point **B**.

Draw the shape in its new position.

Use a ruler.



2 marks



How to support your child with maths

Knowing their times tables – if your child knows their times tables, they can use them accurately and quickly for multiplication, division. To help your child learn their timetables (up to X12) we recommend: Squeebles App & times tables quiz App

Four operations practice: it is important your child can complete methods accurately. (Methods for year 6 child: column addition, column subtraction, short multiplication, long multiplication, short division, long division including expressing remainders as fractions, decimals and remainder form)

Arithmetic speed practice: mymaths games and set your own



How to support your child with maths

Just remember the 3Cs:

Cooking



What can be weighed, measured, estimated and compared at home?

(Metric units of measure used in the lower school. Children in the upper school need to use metric units and be aware of imperial units of measure)

Clocks



How many clocks are there in your house? Are they digital? Are they analogue?

Can your child read both?

Coins



Hand that shopping list over to your children – can they work out your change?



Questions ?